SOUTHERN POWER AND INDUSTRY

Ad Index, page 122

MARCH, 1951

In This Issue

REPORTS FROM SOUTHERN INDUSTRY

Louisiana—Building Design 50
Esso's modern refinery office building at Baton Rouge

Texas—Instrumentation 52
Graphic panels at du Pont's Sabine River Works

South Carolina—Air Cleaning 57
Steel Heddle Manufacturing Co. at Greenville

Georgia—Power Generation 58
New steam units at Union Bag & Paper Corp., Savannah

Maryland—Air Conditioning 69
Tannery air conditions for hide storage

ENGINEERING REFERENCE DATA

Anti-Friction Bearings 63
Removal techniques and cleaning procedures

Noise Abatement 66
Acoustical treatment case histories

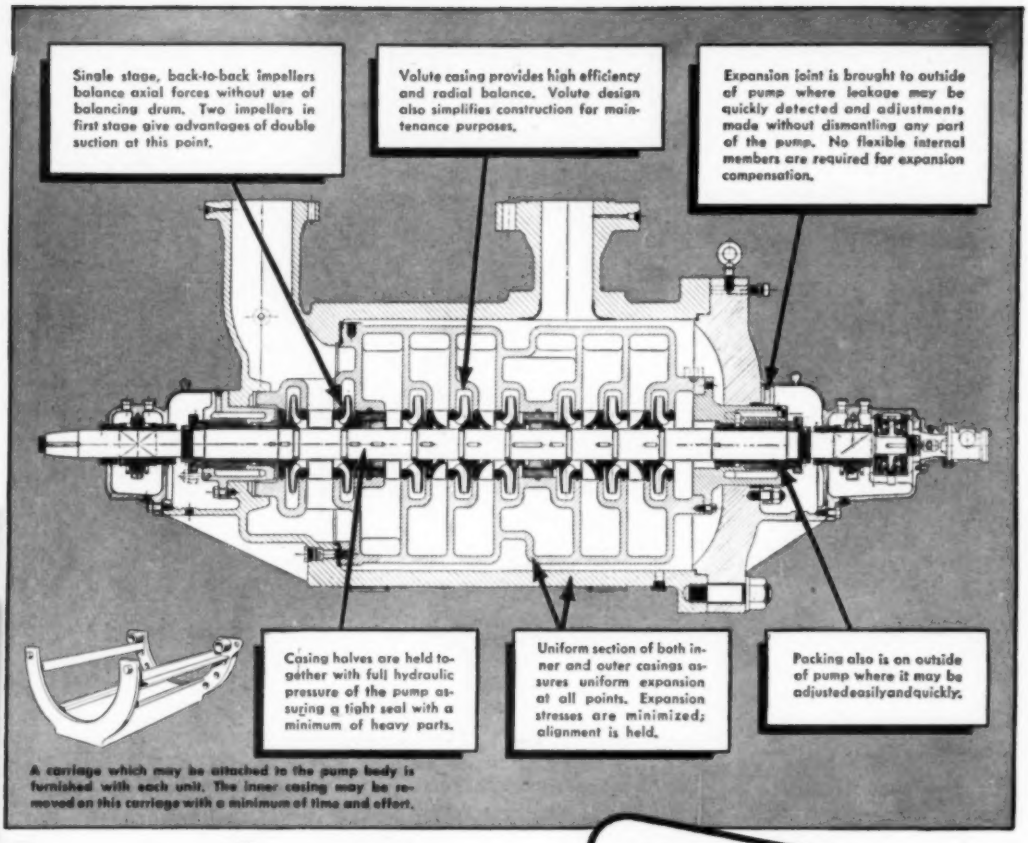
Lubrication 70
Storage and handling

Instrumentation 74
Millivoltmeters

For Full Table of Contents, See Page 3

Graphic Panels

See Page 52


Single stage, back-to-back impellers balance axial forces without use of balancing drum. Two impellers in first stage give advantages of double suction at this point.
Volute casing provides high efficiency and radial balance. Volute design also simplifies construction for maintenance purposes.
Expansion joint is brought to outside of pump where leakage may be quickly detected and adjustments made without dismantling any part of the pump. No flexible internal members are required for expansion compensation.
Casing halves are held together with full hydraulic pressure of the pump assuring a tight seal with a minimum of heavy parts.
Uniform section of both inner and outer casings assures uniform expansion at all points. Expansion stresses are minimized; alignment is held.
Packing also is on outside of pump where it may be adjusted easily and quickly.
A carriage which may be attached to the pump body is furnished with each unit. The inner casing may be removed on this carriage with a minimum of time and effort.

Cost Cutting Features

HERE IS A PUMP designed to meet the needs of the newer high pressure boiler plants. Efficiency is high, maintenance is low and every design feature has a long record of successful application to boiler feed service.

Sizes range from 1200 to 2500 psig and from 300 to 2000 gpm. Allis-Chalmers can supply the complete boiler feed pump installation including pump, motor and control, of coordinated design and manufacture.

Get the details on this new boiler feed pump from your Allis-Chalmers Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin

A-3250

ALLIS-CHALMERS

NEW BOILER FEED PUMP

ALLIS-CHALMERS

SOUTHERN POWER & INDUSTRY is published monthly at 116 E. Crawford St., Dalton, Ga., by W. R. C. Smith Publishing Company, Dalton and Atlanta, Ga., U. S. A.
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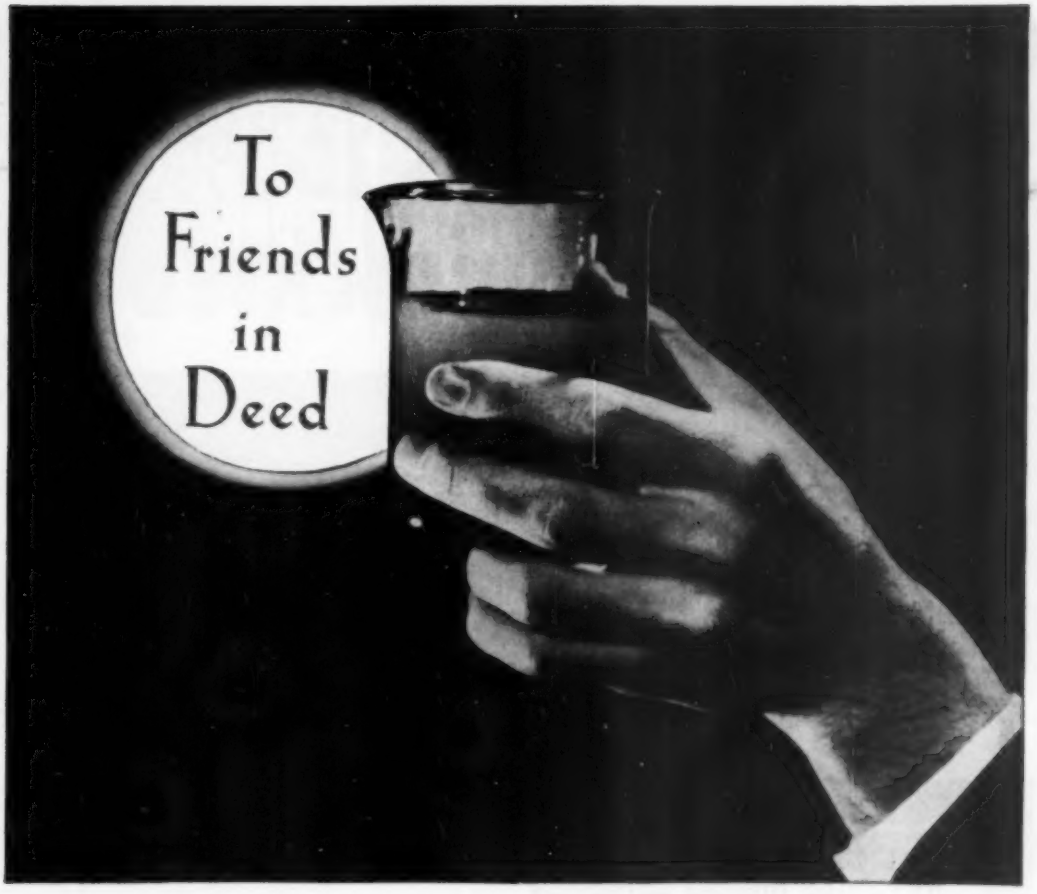


SEVERAL months ago a basic chemical shortage, created by strikes, caused Nalco a great deal of difficulty in supplying adequate quantities of water treatment chemicals to established users.

Uniformly, Nalco System users displayed a wonderful cooperative spirit and understanding patience during this trying period.

We wish to take this public means of thanking and expressing our pride in our friends in deed—and to note with satisfaction that not a single shutdown was reported as being necessary because of an inadequate supply of Nalco chemicals.

With the immediate prospect of greater military and defense uses of many chemicals, it is particularly reassuring to know that Nalco and Nalco System users have a fully demonstrated ability to work closely together in turning adversity into success.

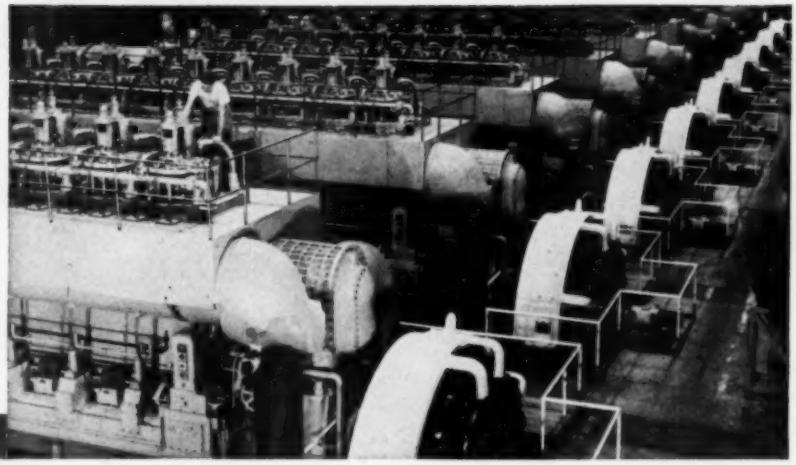
NATIONAL ALUMINATE CORPORATION

6226 West 66th Place • Chicago 38, Illinois

In Canada: Alchem Limited, Burlington, Ontario

THE *Nalco* SYSTEM . . . Serving Industry through Practical Applied Science

GIANT ALUMINUM PLANT GAS DIESELS 100% TEXACO-LUBRICATED



Engines in Reynolds Metals Company Jones Mills Arkansas Aluminum Reduction Plant—one of the world's largest internal combustion plants — include 18 Nordberg Gas Diesels, 9 of which are shown in the illustration. Each of these 9-cylinder, 2-cycle, gas-burning 3,600 h.p. Gas Diesel giants required 16 flat cars for transportation from factory to plant site. *Texaco Ursa Oils* are used exclusively.

Reynolds Metals Company Diesels have used TEXACO URSA OILS exclusively since installation in 1943

For eight years *Texaco Ursa Oils* have given the Gas Diesels in this mammoth installation trouble-free, economical operation. Eighteen giant Gas Diesel engines have delivered full power, with minimum maintenance expense—thanks to *Texaco Ursa Oils*.

Regardless of engine size, efficiency goes up and fuel consumption goes down when you lubricate with *Texaco Ursa Oils*. These fine lubricants resist oxidation, combat carbon and sludge formation, keep ports open and rings free . . . assuring better compression and combustion. *Texaco Ursa Oils* stand up under heat or pressure. Engine parts last longer . . . you save on maintenance costs.

Texaco Ursa Oils are approved by leading engine manufacturers. When you change to Texaco, you'll join the large group of satisfied Texaco users, as witness the fact:

More stationary Diesel h.p. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.

Let a Texaco Lubrication Engineer help you to get better engine performance with the *Texaco Ursa Oil* best suited for your operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

SOUTHERN POWER AND INDUSTRY

MARCH 1951

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CONTENTS

Esso's New Refinery Office—Baton Rouge, La. 50
Graphic Panels, by A. V. Novak 52
Filter System Saves Treated Air 57
Steam Units at Union Bag & Paper, by H. R. Arnold 58
Maintenance of Anti-Friction Bearings, by E. P. Stahl 63
How to Cut Factory Noise, by Francis A. Westbrook 66
Maryland Tannery Air Conditions for Hide Storage 69
Prescription Lubrication, by C. J. Copley and Will Risk 70
Measurement and Control of Process Variables, by E. A. Murphy 74
High Pressure Condensate System Improves Laundry Operation 78
Unit Systems Vs. Interconnection, by Joseph H. Drake 80
Research Facilities for Southern Industry 82

PRACTICAL DISCUSSION

Cleaning Castings 86
Lumber Handling 86
Outdoor Power Equipment 88
Welded Economizer Returns 90
Instruments and Controls 90
Metal Finishing 93
Bearing Manufacture 94
Motor Protection 94

DEPARTMENTS

FACTS AND TRENDS 5
BUYERS INFORMATION 16
TIMELY COMMENTS 47
INDUSTRY SPEAKS 49
NEW EQUIPMENT 96
BOOKS 109
NEWS OF THE MONTH 110
INDEX TO ADVERTISERS 122

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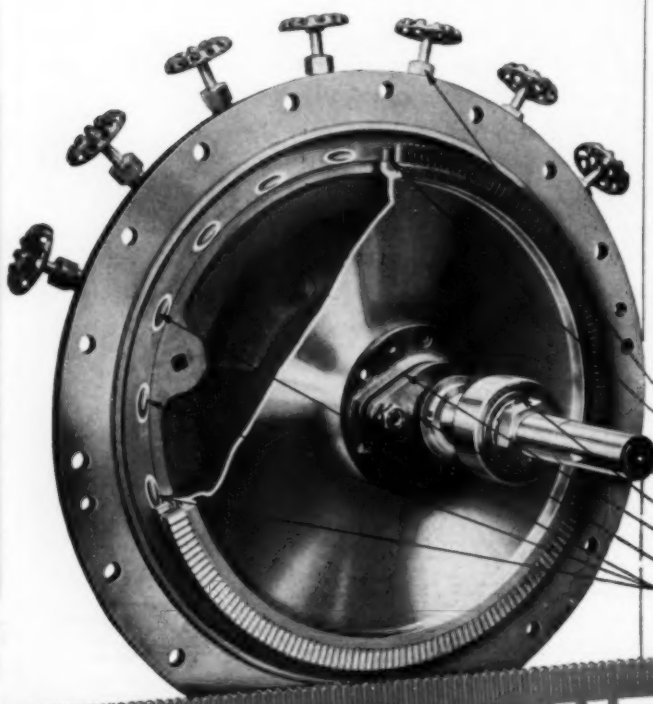
No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.



7 hand valves for efficient partial load operation, (20" turbine shown)

2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced

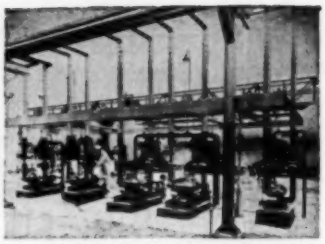
30-40 carbon steel shaft

Oversized double row deep grooved ball bearing

Stuffing box with metallic packing ring

Heavy chrome plating of shaft through stuffing box

3 nozzles always open



Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORP., 243 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

March, 1951

MORE STEEL FOR THE SOUTH AND SOUTHWEST, supplementing the nearly 1,900,000 ton expansion programs previously announced at Bethlehem, Sparrows Point, Md.—900,000 tons; TCI, Birmingham—500,000 tons; Conners Steel, Birmingham—37,600 tons; Green River Steel Corp., Owensboro, Kentucky—190,000 tons; Tennessee Steel Corp., Oneida, Tennessee—100,000 tons; West Virginia Steel & Mfg. Co., Huntington, West Virginia—20,000 tons; Republic Steel, Gadsden—36,000 tons; and Atlantic Steel, Atlanta—100,000 tons.

Lone Star Steel at Daingerfield, Texas will supplement its blast furnace, coke ovens, and by-products facility with a $73 million expansion including $14 million for four open-hearth furnaces, $21 million for soaking pits and rolling mill, $25 million for finishing department and $4 million for general utilities. New production will be principally 2" - 6" diameter pipe for the oil industry. Expansion will provide Texas with its second fully integrated steel manufacturing plant (Sheffield's Houston facility with a capacity of 840,000 tons a year, will remain Texas' largest). With steel ingot capacity of 500,000 tons annually, Lone Star Steel will produce about 350,000 tons of welded steel pipe.

LONE STAR STEEL'S BY-PRODUCTS PLANT produces coal tar, ammonium sulphate and several light oils. A 4" line carries the raw coal tar half a mile to the new ½ million, 10 acre REILLY TAR AND CHEMICAL plant, which produces pipe dip compounds, roof pitch, creosote oil and pipe enamel. Opened in January, the new operation will produce 1,500 tons anually of these four products from 360,000 gallons of crude coal tar.

INDUSTRIAL NOTES FROM THE SOUTHEAST—Marquette Cement Company will construct a $4 million, 1,000,000 barrel per year plant at BRANDON, MISSISSIPPI . . . Owens-Corning Fiberglas Corporation will have 175,000 sq ft Fiberglas yarn plant at ANDERSON, S. C. in operation by mid-1951 . . . Westinghouse starting construction of new manufacturing and repair shops in BIRMINGHAM, ALABAMA . . . T. R. Miller Mill Company to construct $750,000 box factory at BREWTON, ALABAMA . . . Armour Fertilizer Works adding $500,000 addition to BARTOW, FLORIDA phosphate plant . . . Wyandotte Worsted Co. to construct $4 million woolen plant at LAKEVIEW, N. C. . . . Tennessee Products & Chemical Corp. in $800,000 expansion program at NASHVILLE, TENNESSEE.

MID-SOUTH ACTIVITY—United States Rubber Company has purchased the Buna-N synthetic rubber plant of Esso Standard Oil Company at BATON ROUGE, LOUISIANA . . . Alcoa to establish new alumina plant near BAUXITE, ARKANSAS increasing by nearly 50 per cent amount of alumina now being produced by company . . . Louisiana Power & Light increasing capacity of Nine Mile Point plant to 105,000 kw . . . Bay Chemical Co. building $2 million plant at WEEKS, LOUISIANA.

SOUTHWEST BOOM CONTINUES—$7 million expansion program by Cameron Iron Works of HOUSTON to handle defense production . . . multimillion dollar defense contract given to R. G. Le Tourneau fabricating plant at LONGVIEW, TEXAS for Tournadozers and other classified items . . . $4 million National Gypsum plant at PRYOR, OKLAHOMA will manufacture paper for use in making wallboard . . . Coronado Manufacturing Co. will also build and operate a $4 million wrapping paper plant at Pryor with 150 ton daily output (both National Gypsum and Coronado to obtain process steam from adjacent Oklahoma Ordnance Works) . . . AEC production works to be established at AMARILLO, TEXAS.

Douglas Aircraft Company takes over the huge TULSA, OKLAHOMA bomber plant this month for production of Boeing B-47 jet bombers. Plant to be completely integrated unit with considerable sub-contracting . . . Westinghouse Electric building new lamp manufacturing plant at PARIS, TEXAS . . . Trinity Portland Cement (Div of General Portland) is completing a $3,800,000 expansion and im-

provement program in its DALLAS, FORT WORTH, HOUSTON, CHATTANOOGA AND TAMPA, FLORIDA plants. New Dallas plant expansion provided annual production capacity of 1,250,000 barrels . . . $4 million expansion program at Diamond Alkali in HOUSTON will increase production of chlorine and caustic soda from 30 to 50 per cent.

POTOMAC ELECTRIC POWER COMPANY'S new 400,000 kw Potomac River Station features the largest medium gas filled cable ever constructed for operation above 46 kv. Because of airfields, populous areas, etc., overhead transmission was impractical. Studies showed that three 600 MCM-conductor, 69,000 v cables in conduit would be more economical than higher-voltage, single-conductor cables, or cables pulled in pipe.

Conductors and insulation are enclosed in a lead sheath and a nitrogen gas pressure of 35 to 45 lb is maintained inside the cable. The "gas-filled" was preferred to "oil-filled" because of lower installation and maintenance costs. A detailed description of the entire station is featured in the February issue of SP&I.

CARBON BLACK EXPANSION—With several existing operations near Borger, Texas, J. M. Huber will put the first unit of a new BAYTOWN, Texas carbon black plant into operation in May. Second unit of the $3 million construction project, scheduled for completion in November, will raise plant's annual capacity to 72,000,000 lb. Cabot Carbon Company is building a new $4 million operation near the Bayou Sale oil field in St. Mary parish, LOUISIANA with an annual capacity of over 80,000,000 lb.

HOUSTON'S INTERNATIONAL INDUSTRIAL EXPOSITION opens at the Coliseum March 11th with exhibits and activities covering oil field operations, chemical industries and general industrial plant operation and maintenance. The Annual Engineering Show of the University of Houston will be held concurrently with the Exposition, March 11-17th. Exposition provides a means for men in Southern and Southwestern industry to see and study equipment for their own particular use.

IN THE HEAVYWEIGHT CLASSIFICATION is the new Yale 80,000 lb capacity fork truck powered by a 165 hp Cummins diesel driving a 90 kw G.E. locomotive type generator. 84,000 lb truck will lift 80,000 lb load 91-in. Turning radius is 168-in. (14 ft aisle). First in a series of ram and fork trucks in capacities from 20,000 to 100,000 lb, unit is especially designed for steel mill operation.

LIFT YOUR PROCESSING CEILING TO 4600 F—Fused Stabilized Zirconia—a new refractory product of the Norton Company, will withstand that temperature, as compared with fire clay up to 3000 F and fused alumina up to 3300 F. Applicational programs now under way in chemical and metalworking plants. For additional information check the New Equipment section of this issue.

NEW FANNIX OIL BURNER of Coppus, utilizing a jet reaction of steam-atomized oil to rotate a fan which is an integral part of the burner, is claimed to increase boiler ratings, step up fuel efficiency, get rid of "hot spots", eliminate forced draft equipment, cut stack requirements and reduce coking of atomizers.

PAINT, WHICH CHANGES COLOR AUTOMATICALLY at increasing degrees of temperature is aiding Socony-Vacuum engineers in studies of cooling processes for air-cooled internal combustion engines. Formulated to provide 15 basic shades for original application, paint assists in determining proper locations for thermocouples to measure internal heat while an engine is in operation. Without paint, placing of thermocouples may distort air currents around the test engine sufficiently to affect the accuracy of measurements.

Some of the 15 basic paints are capable of six complete alterations in color as temperatures rise. One paint originally violet blue when cold, will become bright green at 311 F; olive green at 446 F; dark gray at 545 F; light gray at 554 F; light brown at 572 F; and buff at 644 F.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY 806 Peachtree St., N.E. Atlanta 5, Ga.

Sinclair Rubilene Resists Oxidation Gives Long, Low Cost Service

Oxidation attacks oil wherever there is continuous recirculation—in enclosed crankcase systems and, especially, in central circulating systems. It forms damaging acidic compounds, gum, carbon, and sludge. Result: frictional drag is increased, oil lines may become restricted or closed, wear accelerated, efficiency and life lowered.

Many years of experience show Sinclair Rubilene successfully withstands oxidation even under sustained high temperatures. This is due to Rubilene's greater stability and ruggedness. At the same time non-foaming Rubilene assures a solid flow of oil to provide a tough oil cushion between all moving parts. Rubilene thus lessens friction and wear and provides high efficiency and smooth operation.

Why not eliminate worry over damaging oxidation and assure reliable lubrication? Use Sinclair Rubilene Oils.

Your nearest Supplier of Sinclair Products will gladly arrange for lubrication counsel, or write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.

SINCLAIR

Shooting for low-cost installation?

Secondary feeders for softball field lights—7,000 ft. of 300,000 cm aluminum cable, neolay insulated, buried direct. Voltage drop held to less than 2% on 220/110-volt circuits. (Runs up to 375 ft.)

figure it in aluminum

You can't miss seeing the saving when you figure wiring in aluminum. For distribution lines, power and feeder cable, for industrial wiring—insulated aluminum electrical conductors cost less to buy, less to install. The bigger the cable, the greater your saving. For names of manufacturers, call your nearby Alcoa sales office (look under "aluminum" in your classified telephone directory). ALUMINUM COMPANY OF AMERICA, 1773C Gulf Bldg., Pittsburgh 19, Pennsylvania.

• • •

Although the rearmament program prevents unrestricted sale of aluminum, we are ready to help you with the planning required for electrical wiring projects. Get the facts! Write for "Questions & Answers About Aluminum Conductors and Installations".

Aluminum Conductors

ALCOA ALUMINUM

of ALCOA EC ALUMINUM are made by leading manufacturers

You Save on 4 Counts with ENCO STREAMLINED BAFFLES

1 Better heat transfer

Enco's improved baffle design insures a uniform, high velocity gas flow over every square foot of heating surface.

2 Low draft loss

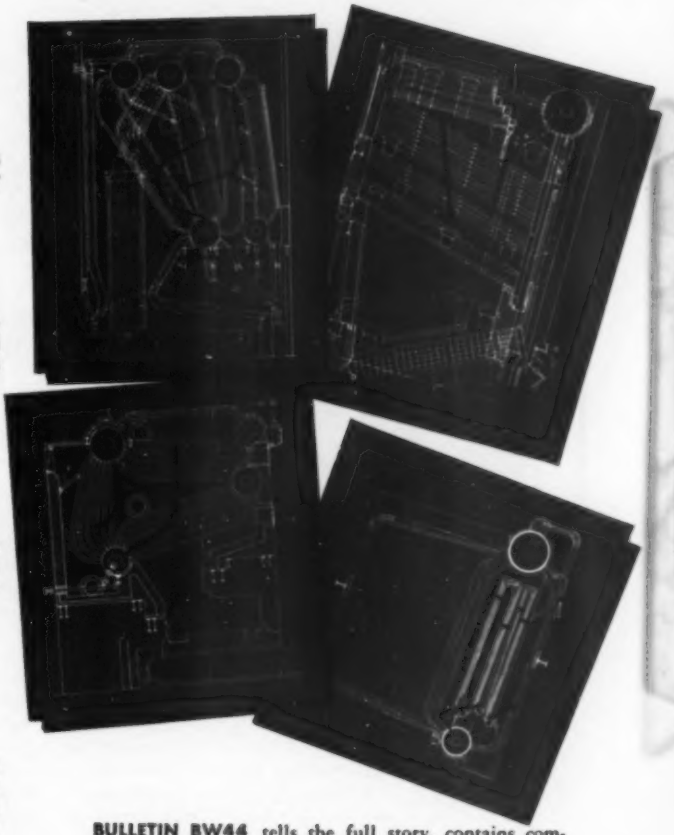
Smoothly curved baffles maintain a cross-flow of gases across the tube banks. Dead gas areas, bottlenecks and eddy currents are eliminated.

3 Less steam, less time for cleaning

Soot doesn't get a chance to accumulate in pockets. Soot blowers are used less often. Streamlined baffles lower maintenance costs.

4 Custom installation

Experienced Enco crews take charge of the installation, repairs and replacements of your individually designed streamlined baffles—do the job thoroughly and quickly with minimum downtime.

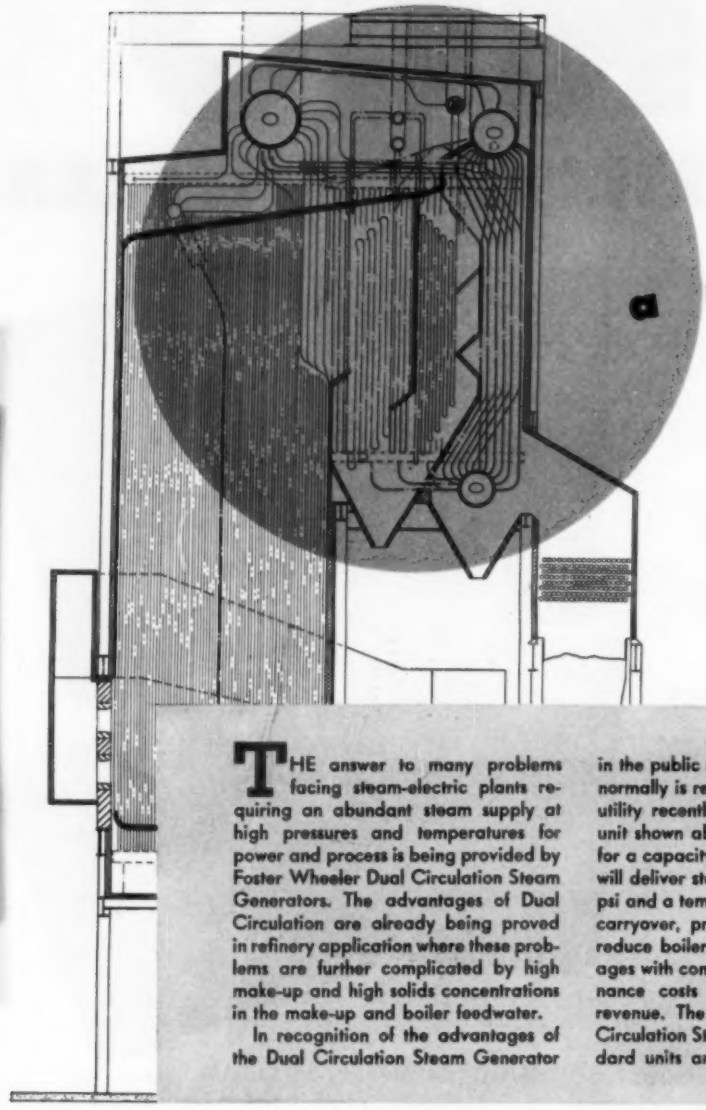


BULLETIN BW44 tells the full story, contains complete engineering data, explains how Enco Baffles provide maximum steam output with minimum fuel consumption. WRITE FOR YOUR FREE COPY TODAY!

THE ENGINEER COMPANY

75 WEST STREET, NEW YORK 6, NEW YORK

IN CANADA: F. J. RASKIN, LTD., 4220 IBERVILLE ST., MONTREAL 34 P.Q.



a utility

THE answer to many problems facing steam-electric plants requiring an abundant steam supply at high pressures and temperatures for power and process is being provided by Foster Wheeler Dual Circulation Steam Generators. The advantages of Dual Circulation are already being proved in refinery application where these problems are further complicated by high make-up and high solids concentrations in the make-up and boiler feedwater.

In recognition of the advantages of the Dual Circulation Steam Generator in the public utility field where make-up normally is relatively low, a midwestern utility recently ordered the three-drum unit shown above. This unit is designed for a capacity of 425,000 lb per hr and will deliver steam at a pressure of 1350 psi and a temperature of 955 F. The low carryover, previously unattainable, will reduce boiler and turbo-generator outages with consequent savings in maintenance costs and gains in operating revenue. The advantages of the Dual Circulation Steam Generator over standard units are illustrated at the right.

● *Write for a Copy of Bulletin B-50-11*

FOSTER WHEELER CORPORATION 165 BROADWAY NEW YORK 6,

specifies... DUAL-CIRCULATION

REDUCED CARRYOVER OF

a. Silica
b. Total Dissolved Solids

LOW CONCENTRATION IN HIGH DUTY FURNACE SECTION RESULTING IN

a. Minimum Tube Damage
b. Reduced Maintenance and Outage Time

IMPORTANT SUPPLEMENTARY ADVANTAGES IN CERTAIN APPLICATIONS

a. Reduced Blowdown With Resulting Reduction In Heat Loss and Size of Heat Recovery Equipment

b. Reduced Cost of Chemicals and Equipment For Water Treatment

NEW YORK

FOSTER WHEELER

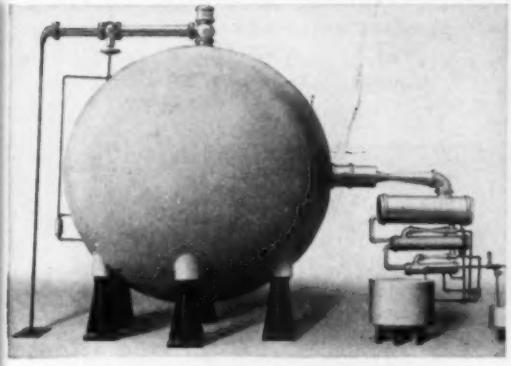
WHY HOT OR COLD TYPE Belco Deaerators PRODUCE OUTSTANDING RESULTS!

The Belco Atomizing Valve is used in the initial step of all Belco Heaters, Deaerators and Hot Process Softeners to insure superior results. The Valve divides the incoming water into such finely atomized droplets that heating is practically instantaneous when sprayed into an atmosphere of steam. Because of the rapid primary heating, the subsequent steps of separation of the gases and/or chemical action are greatly facilitated.

The Belco Atomizing Valve Provides:

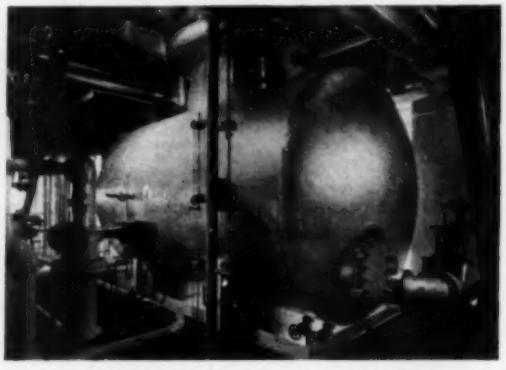
1. The Finest Spray
2. Instantaneous Heating
3. It's own Level Control
4. A Balanced Type Valve
5. Non Clogging—Self Cleaning ports
6. Visual Position Indicator
7. External Adjustments
8. Uniform Spraying over entire flow range
9. Capacities of 1 to 2,000 gpm

In the second-step scrubber section large volumes of steam contact the preheated water and insures complete ebullition and complete removal of all corrosive gases. The oxygen content of the effluent from a Belco Deaerator is less than 0.005 ml. per liter. More information in illustrated Bulletin 103.



BELCO SPHERICAL VACUUM DEAERATOR

Capacity—1,000,000 lbs. per hour
Operating pressure—0.2 ins. hg absolute
Located at large Midwest Chemical Plant



BELCO HIGH PRESSURE STEAM DEAERATOR

Capacity 300,000 lbs. per hour
Operating pressure—30 psig.
Located at large Canadian Oil Refinery

BELCO COMPETENT ENGINEERING—The many years of experience behind Belco's well informed staff of engineers, both in the field and on the drawing board, covering the types of equipment listed below, is available to you at all times. Call on these engineers for authoritative assistance and close cooperation.

BELCO INDUSTRIAL EQUIPMENT DIVISION, INC.

BOGUE ELECTRIC MANUFACTURING COMPANY

PATERSON 3, NEW JERSEY

BELCO PRODUCTS

SWIMMING POOL PURIFICATION EQUIPMENT: Automatic and Manual • **WATER SOFTENERS:** Hot Lime Soda, Balcolite, Gravity and Pressure Types, Automatic and Manual • **FILTRATION EQUIPMENT:** Gravity and Pressure Filters, Automatic and Manual Filters, Siliceous and Non-Siliceous Filters, Iron, Oil, Taste, Odor and Color Removal Filters • **DIATOMACEOUS EARTH FILTERS** • **COAGULATION EQUIPMENT:** Slow and Rapid Mix Agitators (Adjustable variable speed), Setting Tanks, Sludge Removers • **SPECIAL EQUIPMENT:** De-Ionized (Equivalent to Distilled) Water Equipment, Silica Removal Equipment, Boiler Feed Water Heaters, Deaerators, Degasifiers, Chemical Dry Feeders, Chemical Pressure Feeders, Oil Separators (Refining process type) • **AUTOMATIC PROCESS CONTROL**

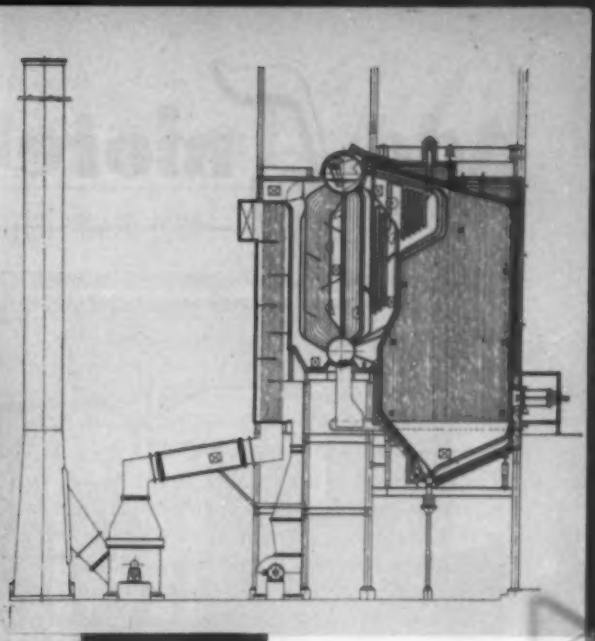
BOGUE PRODUCTS

MAGNETIC AMPLIFIERS: Magnetic Type Voltage Regulation, Magnetic Type Speed Regulation, Servo Systems • **PETROLEUM EQUIPMENT:** Tank Gauging Equipment (Automatic for open or closed tanks) • **MARINE EQUIPMENT:** Surface Search Radar, Automatic Steering Equipment, High Capacity Bilge Pumps • **ELECTRONIC COMMUNICATION EQUIPMENT** • **AIRCRAFT EQUIPMENT:** Automatic Aircraft Circuit Testers • **ELECTRICAL EQUIPMENT:** 400 Cycle Generators, Magnetic variable speed motor drives— (no vacuum tubes required), AC Motors—DC Motors, Synchronous Motors, Alternators, Investors, Generating Sets, Plating Equipment, Motor Generators.

Belco

PROCESSES FOR REMOVAL OF WATER IMPURITIES

Another New SPRINGFIELD Steam Generator...



Location:
W. R. (Bob) Poage Steam Plant
Belton, Texas

Consulting Engineers:
Loramore & Douglass, Inc.
Chicago, Illinois

2nd Unit being added to W. R. (Bob) Poage Steam Plant

SPRINGFIELD *again* is the choice for the second steam generating unit of the W. R. (Bob) Poage Steam Plant located near Belton, Texas! Like the first generator, the second is a modern, two-drum, bent tube Springfield design arranged for outdoor installation in front of the partially completed structure appearing at the left in the above photograph. Complete with superheater and air heater, it will handle loads ranging from 60,000 to 130,000 lbs. of steam per hour at 630 psig operating pressure with 825°F. total steam temperature at superheater outlet. Firing is with natural gas or oil.

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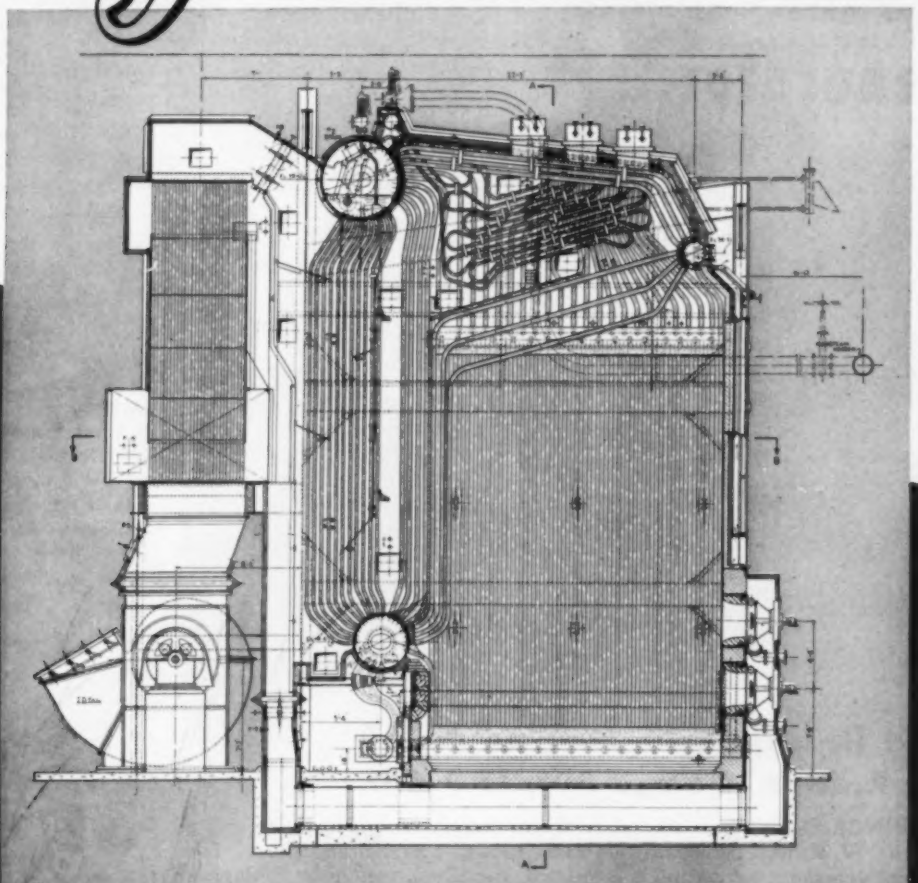

Cross Section of the ten 300,000 lbs./hr. Riley gas and oil fired Steam Generating Units of this large chemical plant. These units operate at 500 psig and 750°F. In addition to these ten Riley Units, there are six 450,000 lbs./hr. Riley Units operating at 1425 psig and 900°F.

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...making a total of 10

This will be the South's largest industrial power plant

The first three Riley Units at this large outstanding chemical plant were installed in 1940. Two additional units were installed in 1941, another two in 1946, one more in 1950 and the ninth and tenth units will be installed in 1951. In addition to these ten Riley Units, four more units having a capacity of 450,000 lbs./hr. and operating at 1425 psig—900°F. steam, will be added to the existing two units of this size. These 14 units with a total capacity of 5,700,000 lbs./hr. will make this one of the largest industrial power plants in the south. This company has placed 10 orders with Riley for 18 boiler units.

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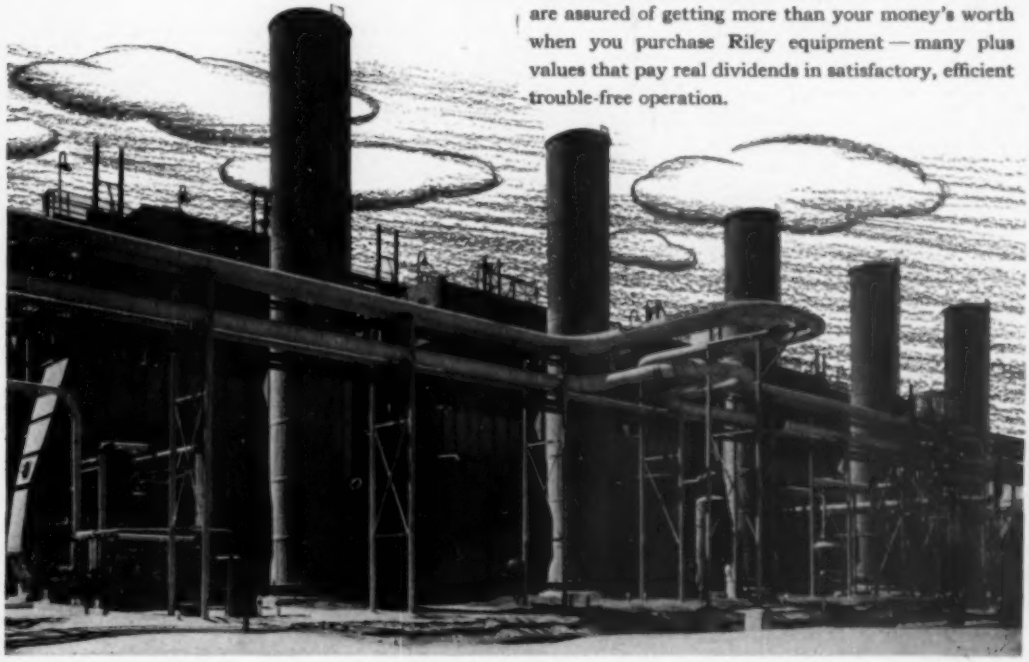

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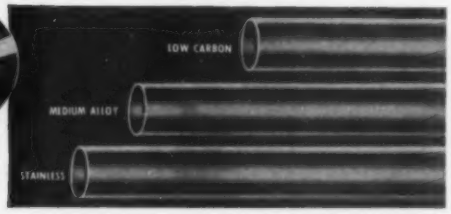

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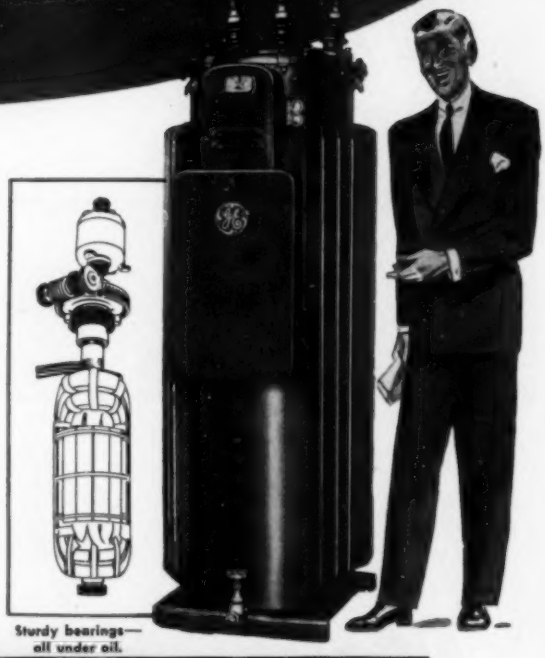
General Electric IRS induction voltage regulators give accurate, stepless regulation—with no time-delay. They respond immediately and will correct the voltage at an average rate of 1 per cent in 1½ seconds throughout the entire range of ±10% regulation.

And—no other regulator can match them in low maintenance costs. Ask for Bulletin GEA-2985.

Apparatus Dept., General Electric Company, Schenectady 5, New York.

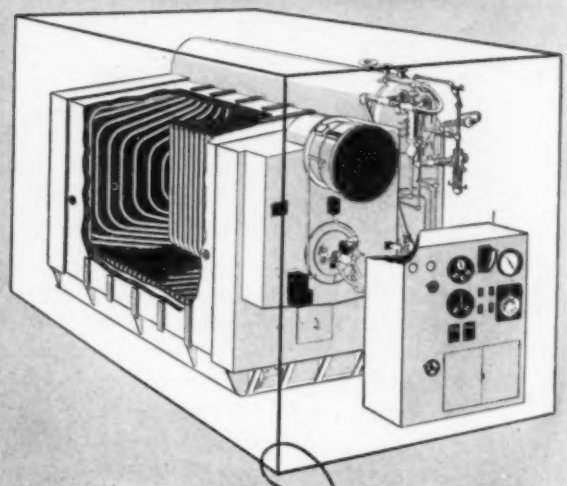


Sturdy bearings—all under oil.

GENERAL ELECTRIC

get your steam

3,500 to 25,000 lb per hr



B&W Integral-Furnace Boiler, Type FM

- in this
- NEW
- shop-
- assembled
- unit

note these **cost-saving** features

- Saves Erection Time and Cost
- Meets Wide Range of Services
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

Send for Bulletin G-72, detailing the many advantages of this new B&W creation in low-cost steam generation. The Babcock & Wilcox Company, 85 Liberty Street, New York 6, N. Y.

Helping Industry Cut Steam Costs Since 1867

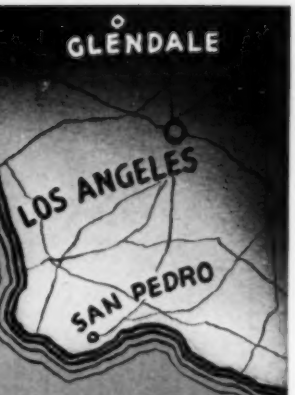
BABCOCK & WILCOX

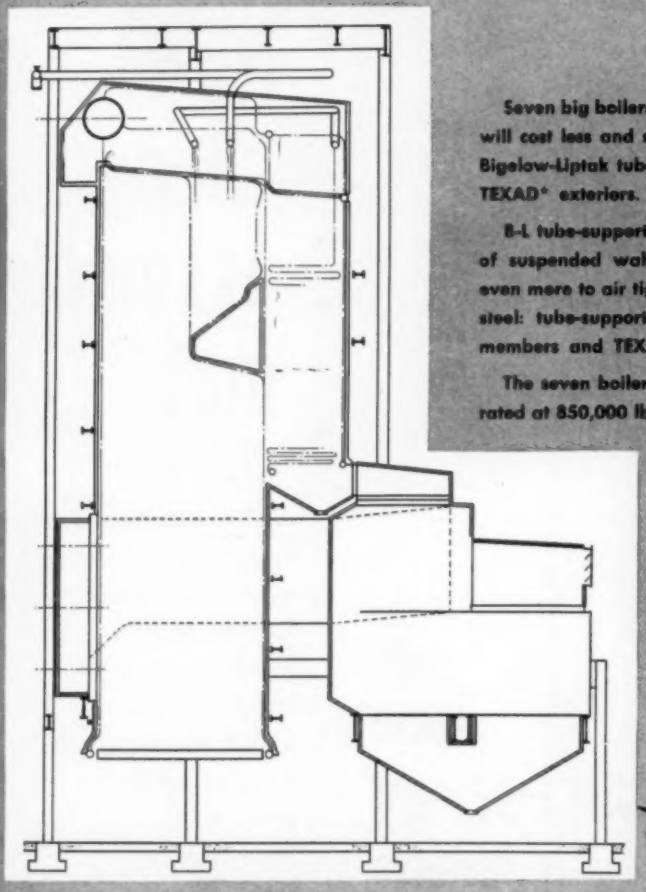
G-536

TEXAD*

SAVES HARD-TO-GET STEEL

in Southern California





Seven big boilers going up in Southern California will cost less and save steel because specs call for Bigelow-Liptak tube-supported wall enclosures and TEXAD* exteriors.

B-L tube-supported walls maintain the principles of suspended walls. Weatherproof TEXAD* adds even more to air tightness. Both developments save steel: tube-supported walls won't need structural members and TEXAD* eliminates plate.

The seven boilers — all over 100,000 lb and two rated at 850,000 lb—will be erected in Los Angeles, Glendale and at Terminal Island near San Pedro. In addition, one 400,000 lb boiler and a 100,000 lb unit are now in successful operation in Amarillo, Texas, and Waterloo, Iowa.

Write today for information on how these two B-L innovations can work into your plans. Catalogs are available.

Bigelow-Liptak is supplying the complete enclosure for this king-sized 850,000 lb boiler.

*TRADE MARK

BIGELOW-LIPTAK

Unit-Suspended Walls + Arches

BIGELOW LIPTAK Corporation

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Where there's industry, there's power—and where there's power there's a Powell Valve for every flow control service.

Quality fine throughout "The Line"

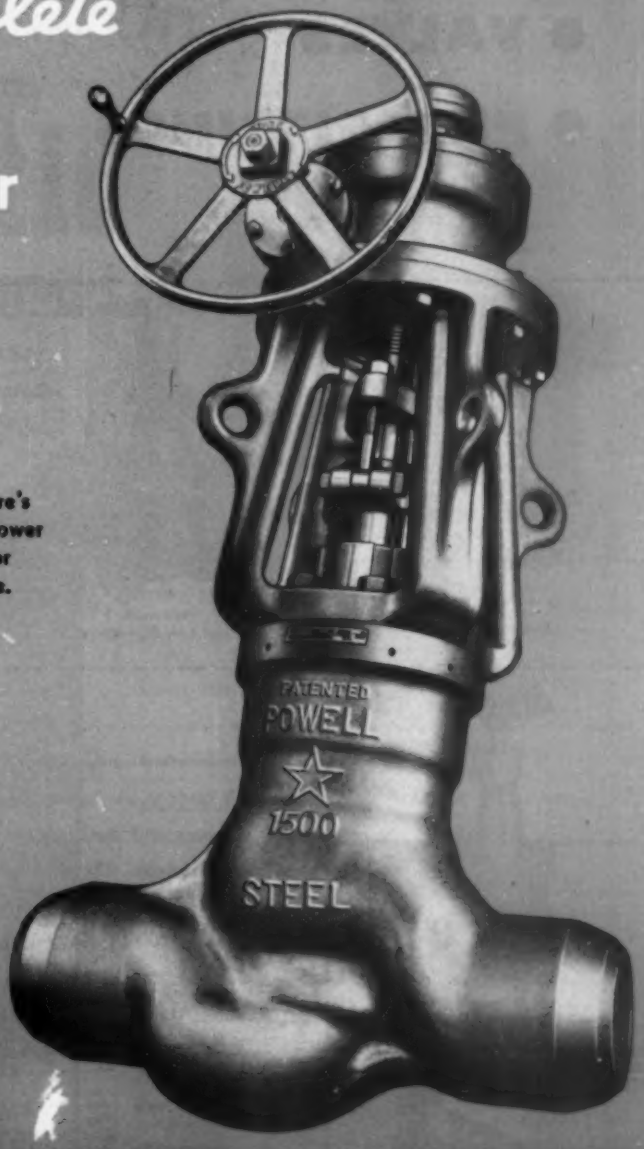

Fig. 11331. A 1500-pound Cast Steel Pressure Seal Globe Valve for Power Plant service. Welding ends and bevel gear operation. Its streamline design reduces pressure drop and turbulence within the valve to a minimum.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

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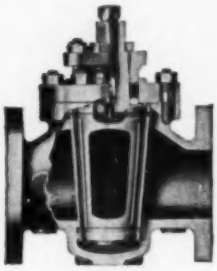
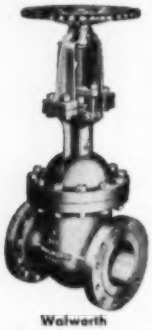
● PIPE FITTINGS



Walworth
Lubricated Plug Valve



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Walworth manufactures a *complete line* of valves and pipe fittings: all made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, Walworth products reflect more than a century of experience in the manufacture of quality valves and fittings.

Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

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BOILER FEED PUMPS

Reflect Customer Confidence In Product and Service Rendered

1	Original Purchase	1 unit—486,000 lbs. per hour—1600 psi discharge pressure.
	FIRST REPEAT	5 units each—800,000 lbs. per hour—2430 psi discharge pressure.
	SECOND REPEAT	6 units each—650,000 lbs. per hour—2430 psi discharge pressure.
2	Original Purchase	3 units each—500,000 lbs. per hour—1920 psi discharge pressure.
	FIRST REPEAT	3 units each—500,000 lbs. per hour—1920 psi discharge pressure.
3	Original Purchase	6 units each—405,000 lbs. per hour—1755 psi discharge pressure.
	FIRST REPEAT	3 units each—405,000 lbs. per hour—1755 psi discharge pressure.
4	Original Purchase	1 unit—372,000 lbs. per hour—550 psi discharge pressure.
	FIRST REPEAT	3 units each—200,000 lbs. per hour—1073 psi discharge pressure.
5	Original Purchase	6 units each—95,000 lbs. per hour—600 psi discharge pressure.
	FIRST REPEAT	30 units each—153,000 lbs. per hour—765 psi discharge pressure.
	SECOND REPEAT	3 units each—153,000 lbs. per hour—765 psi discharge pressure.

MAKE YOUR NEXT BOILER FEED PUMP A "PACIFIC"
... THERE'S ONE FOR EVERY SERVICE!
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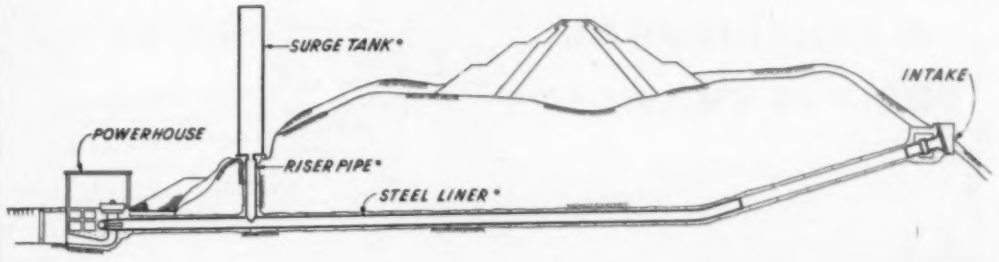
** Structures fabricated and erected by Chicago Bridge & Iron Company*

POWER FACILITIES

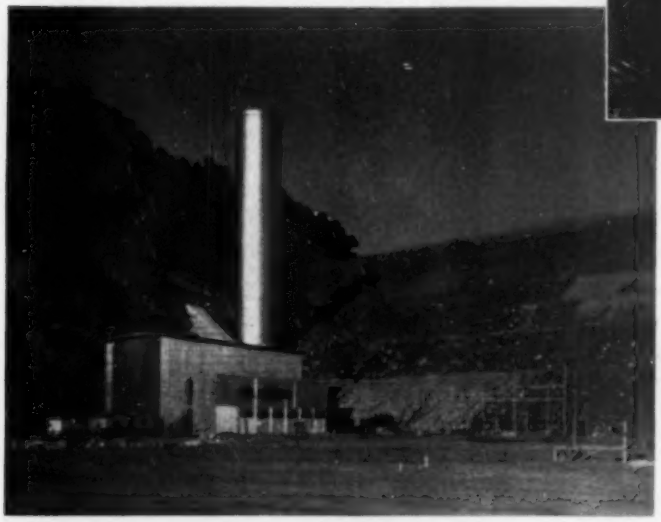
GENERAL ARRANGEMENT

SOUTH HOLSTON PROJECT
TVA



Shortly after Pearl Harbor, Congress approved initial funds for installation by the Tennessee Valley Authority of an earth and rock fill dam on the south fork of the Holston River near Bristol, Tenn.

When the almost-complete project is finished, it will provide about 350,000 acre-feet of normal storage for flood control and will develop 35,000 kilowatts of electric power. As part of the power facilities, we fabricated and erected a Horton surge tank and a welded steel tunnel lining for 845 ft. of the 1200 ft. conduit that carries water from the forebay to the turbine. The surge tank acts as a reservoir that furnishes water to the wheel when sudden demand is made for more . . . or stores water when the load is put on the wheel and water velocity in the conduit is decreased.



Above: View of the welded steel lining being installed in the tunnel at the South Holston dam near Bristol, Tenn. The internal "spiders" hold the rings of the lining in shape until concrete is poured around them and are then removed.

Left: View of the surge tank and powerhouse. The surge tank is 35 ft. in diam. by 187 ft. high and is connected to the steel tunnel lining by a riser 14 ft. in diam. by 79 ft. long.

Surge tanks and penstocks are examples of the heavy steel plate work we fabricate in our shops and erect. Write our nearest office for a quotation the next time you need a steel plate structure.

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Cleveland 15.....2218 Guildhall Bldg.
Detroit 26.....1534 Lafayette Bldg.
Houston 2.....2132 National Standard Bldg.
Los Angeles 17....1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3.....1646—1700 Walnut St. Bldg.
Salt Lake City 4.....545 West 17th South St.
San Francisco 4.....1531—200 Bush St.
Seattle 1.....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.
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Pointers on Pumps

WHAT HAPPENS WHEN THE SPEED OF A CENTRIFUGAL PUMP IS CHANGED?

The characteristics of a centrifugal pump are revealed by curves showing the relation between developed head and capacity, and between brake horsepower and capacity. These curves are usually based on a constant speed and a definite impeller diameter. When the pump's speed is changed, the resulting changes in its performance curves can be predicted by a few calculations. For every point on the original curves there is a corresponding point on the curves for the new speed — and by plotting a sufficient number of these points, curves can be drawn to show the pump performance at the new speed.

HOW TO PLOT THE PERFORMANCE CURVES FOR A 4" PUMP AT 1600 RPM WHEN THE CHARACTERISTICS AT 1750 RPM ARE KNOWN

GPM = gallons per minute RPM = revolutions per minute
H = head in feet BHP = brake horsepower
At constant impeller diameter:

$$\frac{GPM_2}{GPM_1} = \frac{RPM_2}{RPM_1} = \frac{\sqrt{H_2}}{\sqrt{H_1}} = \frac{\sqrt[3]{BHP_2}}{\sqrt[3]{BHP_1}}$$

Taking 900 gpm and 80 ft. head at 1750 rpm as point number 1, then:

$$GPM_2 = \left(\frac{RPM_2}{RPM_1}\right) GPM_1 = \left(\frac{1600}{1750}\right) 900 = 823 \text{ GPM}$$

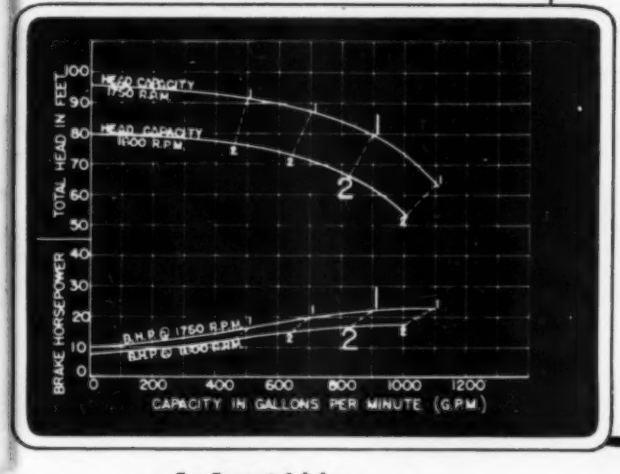
$$H_2 = \left(\frac{RPM_2}{RPM_1}\right)^2 H_1 = \left(\frac{1600}{1750}\right)^2 80 = 66.8 \text{ Feet}$$

$$BHP_2 = \left(\frac{RPM_2}{RPM_1}\right)^3 BHP_1 = \left(\frac{1600}{1750}\right)^3 22 = 16.8 \text{ BHP}$$

By taking other points for number 1, such as 500 gpm at 91 feet, 700 gpm at 87 feet and 1100 gpm at 64 feet, enough corresponding number 2 points are located to draw the expected 1600 rpm performance curve.

NOTE: It is also possible to predict the effect of changing the impeller diameter at a constant speed, by applying the basic formula:

$$\frac{GPM_2}{GPM_1} = \frac{Diameter_2}{Diameter_1} = \frac{\sqrt{H_2}}{\sqrt{H_1}} = \frac{\sqrt[3]{BHP_2}}{\sqrt[3]{BHP_1}}$$

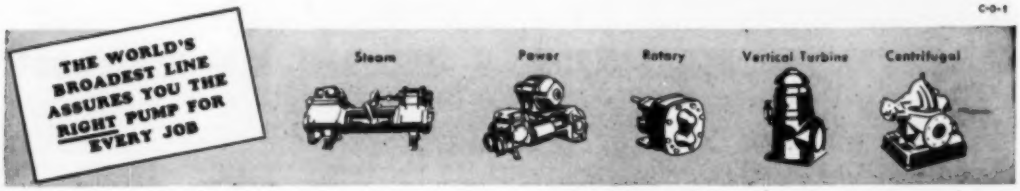

TOTAL HEAD IN FEET
HEAD CAPACITY 1750 R.P.M.
HEAD CAPACITY 1600 R.P.M.
BRAKE HORSEPOWER
B.H.P. @ 1750 R.P.M.
B.H.P. @ 1600 R.P.M.
CAPACITY IN GALLONS PER MINUTE (G.P.M.)

For Expert Advice . . .

on any pumping problem, contact our nearest District Office. And for sure satisfaction in any pumping application, choose from the most complete line of pumps in the field . . . the line that proves *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

WORTHINGTON

C-D-1



Detroit Double Retort Stoker

now available with

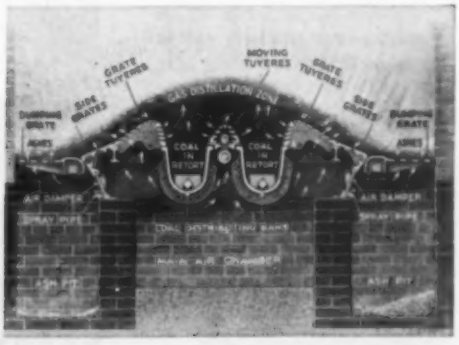
DETROIT ADJUSTABLE FEED

Provides a wide variation in fuel supply to the retorts and is now available with Detroit Double Retort Stokers.

When coupled to a master regulator, which also varies the air supply, the adjustable feed provides fully automatic control of fuel and air. Higher thermal efficiencies at all capacities.

For Many Boilers—Two Retorts Are Better Than One

The Detroit Double Retort Stoker is a multiple retort stoker with two retorts, having the *side cleaning* feature. Provides high efficiency with boilers of medium capacity. Adjustable, continuous sideward movement of the center row of tuyeres is an exclusive feature that gives positive movement of the burning fuel toward the dumping grates. • Write for recommendations.



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Use Raybestos-Manhattan packings and gaskets for the valves in your plant, whether they're for oil, water, steam, sewage, chemicals, or any other gas or fluid. R/M manufactures a complete line of packings not only for valves, but for practically every type of industrial equipment. Your R/M distributor will be glad to help you select the right packing. Or write for the new R/M packing catalog today.

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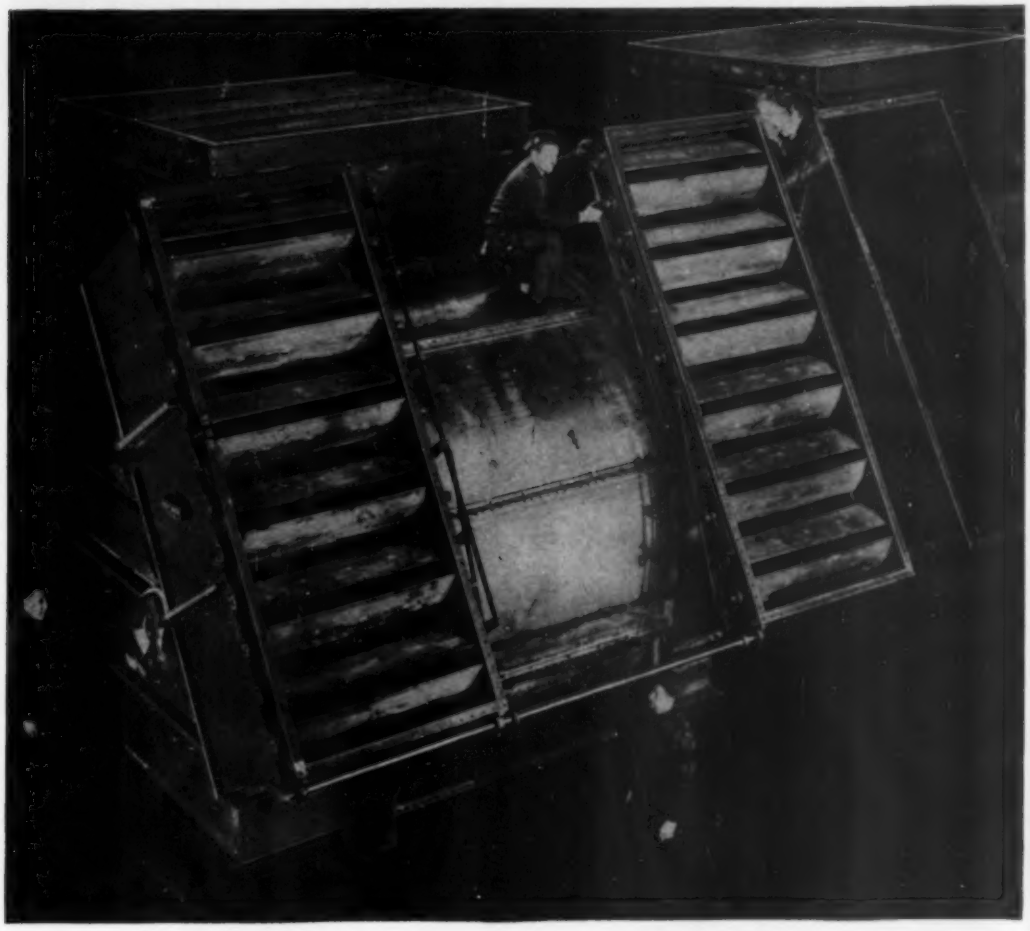

"Buffalo" Induced Draft Fan--

one of six built for prominent power company. 16′ 2″ high, it has a rated capacity of 202,500 cubic feet a minute against 15″ static pressure. In service, a continual storm of fly ash will pass through this fan. That's why "Buffalo" builds Induced Draft Fans ruggedly—to stand power plant service the maximum time without repairs or shutdowns. And that means lower power costs! Note "Buffalo" Paraflow Dampers on inlets and outlet for accurate draft control.

Big Wheel in the Power Industry!

At right, the 12½ ft. wheel for the fan shown above. Note heavy plate construction with welded-on wearing strips on blades. The wheel takes the beating in draft work—that's why "Buffalo" wheels are TOUGH!

WRITE FOR FACTS! Dependable draft is a fundamental way to keep power costs down. Pick "Buffalo" Forced and Induced Draft Fans and be sure! Write for Bulletin 3750 for all the facts.

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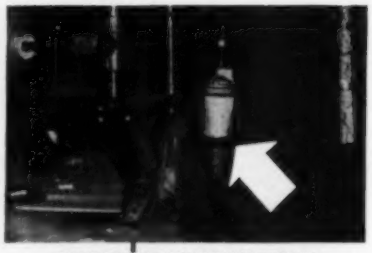
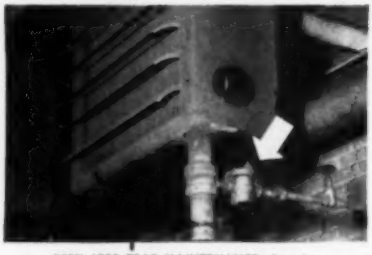
A STEAM TRAP MECHANISM GOOD FOR 900°F, 950 PSIG

. . . will last a long time on low and medium pressures

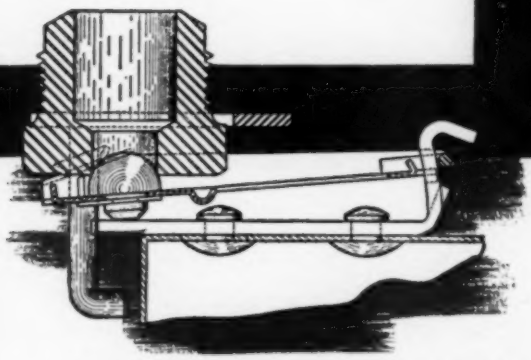
THESE ARMSTRONG USERS KNOW



"TRAPS OPERATE 4 TO 5 YEARS WITHOUT REPAIRS." . . . Weymouth Art Leather Co., South Braintree, Mass.



"50% LESS TRAP MAINTENANCE since installing Armstrongs on low pressure vacuum return heating system." . . . John Deere Ottumwa Works, Ottumwa, Iowa.



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FACTS, FIGURES, PRICES

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ARMSTRONG STEAM TRAPS

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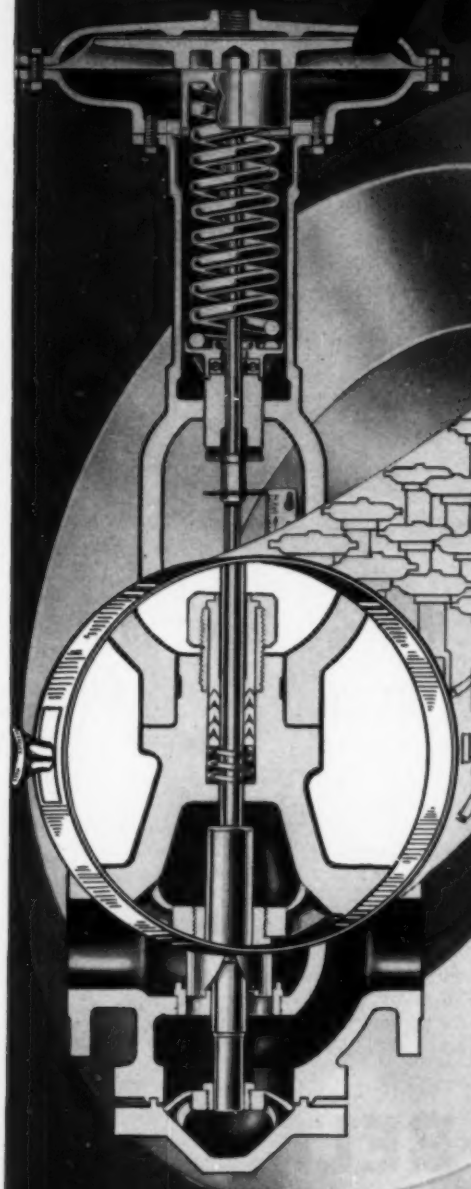
V-RING PACKING



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- *Elimination of maintenance an adjustment.*
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*Teflon is the trade nam

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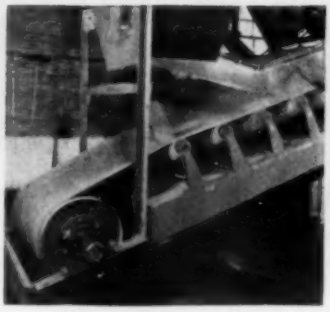
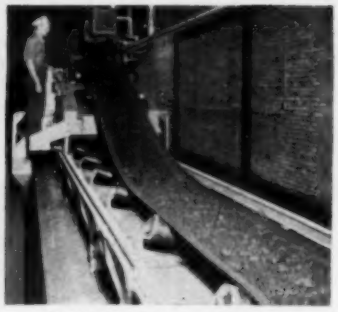
LINK-BELT engineering experience...

Belt conveyors deliver coal to storage yard and power plant.

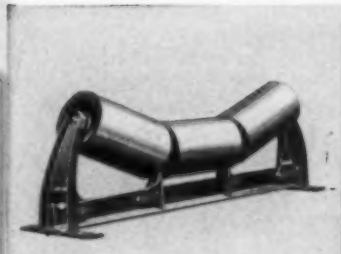


Chutes deliver graded coal to an ascending belt conveyor.

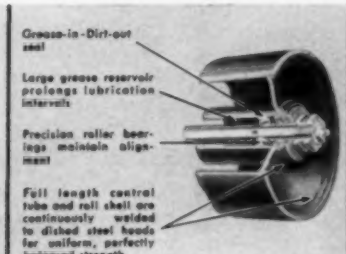


Distributing belt conveyor discharges coal to overhead bunker.

LINK-BELT quality components...



Standard for industry—L-B "100" Idler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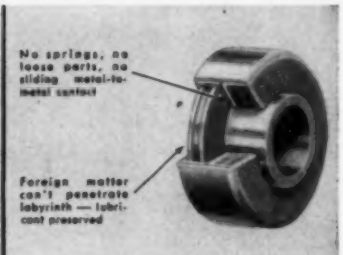
Less lubrication and adjustment


No springs, no loose parts, no sliding metal-to-metal contact
Foreign matter can't penetrate labyrinth — lubricant preserved

Grease-in-Dirt-out Seal

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Equally important, Link-Belt Belt Conveyor engineers can draw on the broadest coal handling experience in the industry. They'll work with you and your consultants—help you come up with the right system for your requirements.

Call or write the Link-Belt branch office nearest you for the services of a belt conveyor expert.

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in Principal Cities. 12.040

TRI CLAD MOTORS
REG. U.S. PAT. OFF.
will run safely without relubrication for as long as any general-purpose motor you can buy—
and if the application makes relubrication a must, you can grease a TRI CLAD without halting production
GENERAL ELECTRIC
HERE'S WHY

TRI CLAD MOTORS will run safely without relubrication for as long as any general-purpose motor you can buy—

Tri-Clad extra lubrication "protection" can save you money because:

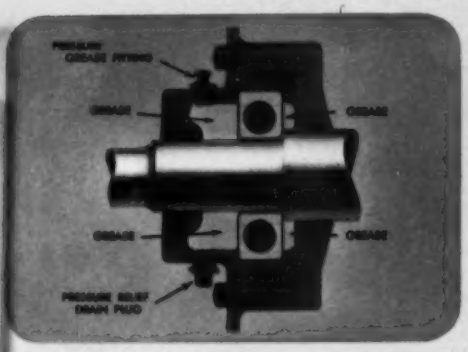
1. Tri-Clad's oversize grease reservoir and the heaviest standard-service bearings mean you do not have to bother with greasing between motor check-ups.

2. When relubrication is needed on those tough applications, you can grease a Tri-Clad without interrupting production-line operations.

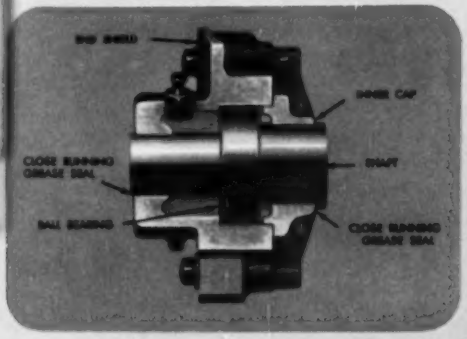
Tri-Clads are grease-gun easy to lubricate *on the job*. Moreover, a Tri-Clad motor will run safely where an ordinary motor would fail. Chances are you'll be spared the cost of a "special" motor.

YOU BE THE JUDGE! The best way to prove to yourself that Tri-Clad gives you the most for your motor dollar is to contact your local G-E office. Tri-Clad stocks are complete. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

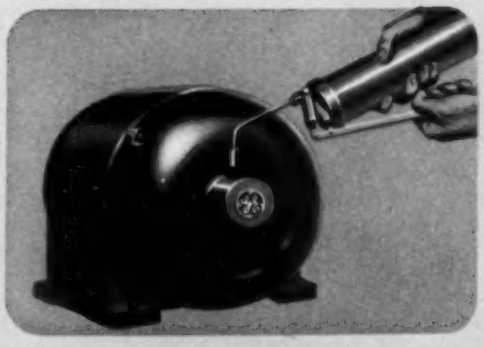
1 **EXTRA BEARING PROTECTION** — Tri-Clad gives you extra bearing protection because heaviest standard-service bearings are carefully selected to withstand severe loads for long periods.



2 **EXTRA GREASE** — Four times the ordinary amount of grease is packed into the large Tri-Clad grease reservoir. Since bearing life depends on grease, this means that Tri-Clad motors will run safely for years — for as long as any general-purpose motor you can buy.



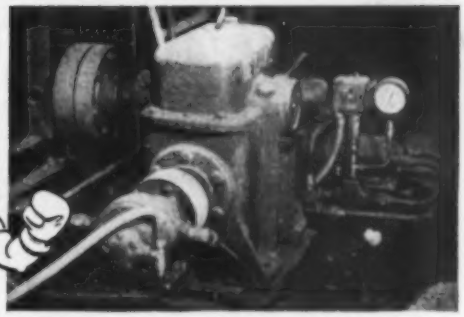
3 **SEALED-IN BEARINGS** — Bearings and grease are completely sealed in a cast housing with long running seals for extra protection from dirt, dust, and lubricant leakage.



4 **PRESSURE-RELIEF GREASING** — An efficient system of pressure-relief lubrication (with standard fittings) enables a Tri-Clad motor to be quickly and easily greased on the job when and if it's needed.

GENERAL ELECTRIC

De Laval products at work!



Tough service?... You bet!

0 to 800 rpm in 8/10 Second . . . 26 Times per Minute. And this De Laval speed reducer takes it and likes it. This particular unit is driving a conveyor belt that automatically feeds and measures billets going into a shear. If you are rough on reducers in your plant, tell your problems to one of our power transmission engineers.

What do you want to pump?

Molasses, Glue, Lard, Soya Oil, Film Dope, Corn Syrup, Vegetable Oil, Paste, Fuel Oil, Shortening, Resin, Varnish, Linseed Oil, Viscose Rayon, Liquid Latex . . .

We frankly don't know all the other products that an IMO can pump, but if you want a better way to transfer fluids like these from one place to another, chances are an IMO can do the job for you. The IMO is a screw-type rotary pump. Its axial flow design permits liquids to be pumped close to the axis of the rotor. This means low liquid velocity through the pump and quiet pulsation-free flow. Capacities range to 1000 gpm at 500 psi and 150 gpm at 1500 psi.

There's a new idea here!

We've simplified the already simple centrifugal pump! Our new GS pump is designed so that every working part . . . every part subject to wear, is contained in one easily replaced unit rotor assembly. Through our Service and Exchange Plan new rotor assemblies are available for immediate shipment from conveniently located stocks throughout the country.

This means good service, and if maintenance ever does become necessary, all you have to do is remove the cover and end plate bolts, lift out the old rotor and drop a new one in place. *It's that easy!* Capacities to 400 gpm — heads to 230 feet.

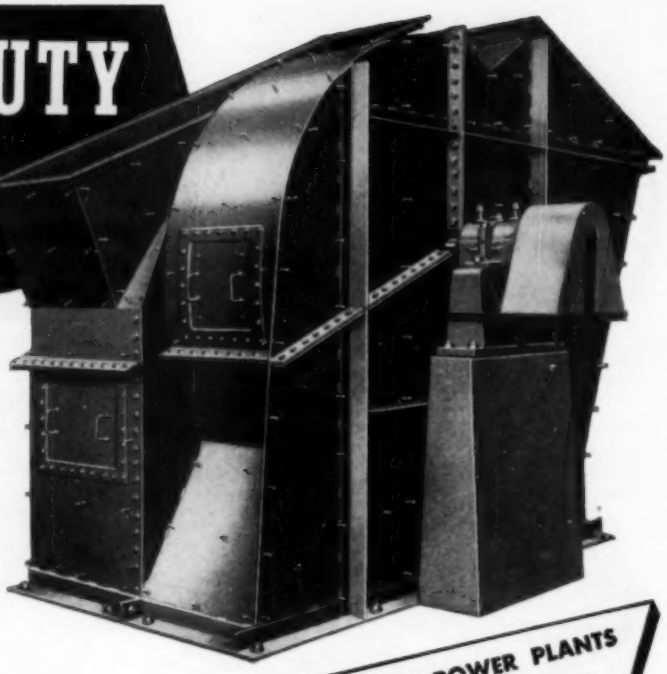
DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

6-1-51

50th DE LAVAL Anniversary

HEAVY-DUTY
for *Important*
FAN JOBS



This ad shows Clarage Type RT Fans, especially designed and built for *tough* air handling services — large volumes (up to 300,000 c.f.m.), high static pressures, high temperature applications.

Induced draft is one of the services to which this Clarage equipment is *particularly* adapted. The Type RT Fan at right is arranged for induced draft fan work. It is equipped with inlet box, insulation clips and water-cooled bearings which permit the handling of extremely high temperature gases with long-lasting performance.

Type RT Fan construction is HEAVY-DUTY — and that applies to wheel, bearings, shaft, housing, *every* fan part.

MORE THAN 3000 POWER PLANTS ARE *Now* CLARAGE EQUIPPED

The Type RT Fan at left is equipped with *fan*-cooled bearings. For medium high temperature work (industrial process air handling and some types of induced draft), *fan*-cooled bearings — *a Clarage development* — are practical and *less expensive* than water-cooled bearings.

All Type RT Fans operate at speeds suitable for direct drive from electric motors or steam turbines.

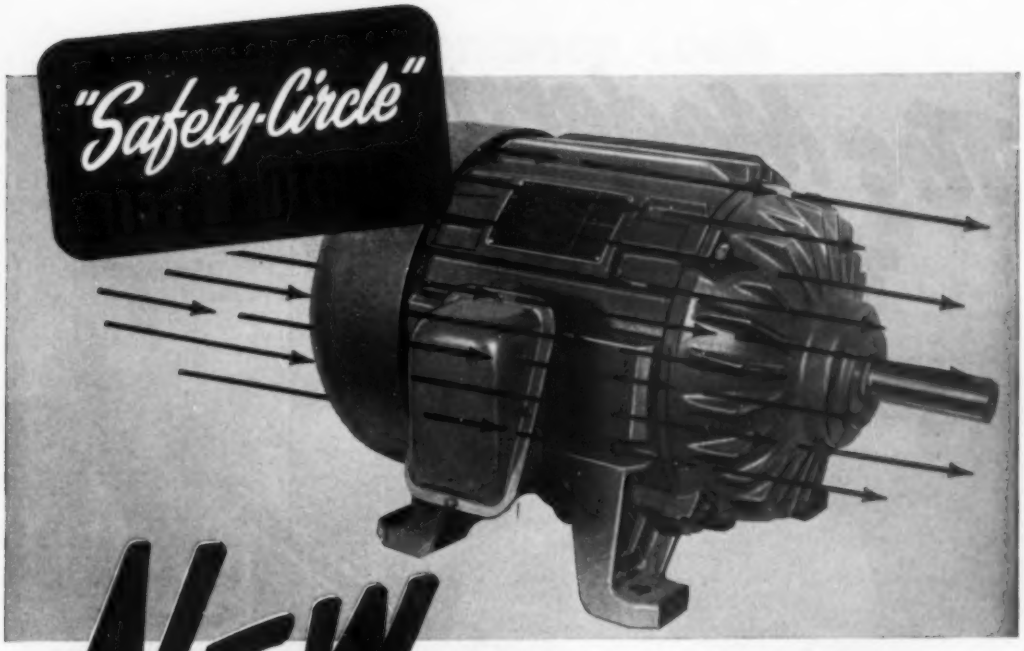
DIRECT YOUR INQUIRY INTO CAPABLE HANDS

Clarage equipment — from the smallest to largest fans — is built HEAVY-DUTY. Whatever your air-handling problems, we can provide satisfactory results at astonishingly low operating and maintenance costs. *Your inquiry is invited.*

CLARAGE FAN COMPANY
KALAMAZOO, MICHIGAN

CLARAGE
—HEADQUARTERS for Air Handling and Conditioning Equipment

Sales Engineering Offices in All Principal Cities



NEW Easy to Clean Resists Corrosion

CORROSIVE ATMOSPHERES CAN'T HURT this Allis-Chalmers totally enclosed, fan-cooled motor because major parts are enclosed in a rigid corrosion resistant cast iron frame! No extra treatment is needed and cast iron's corrosion resistance won't chip off.

Lower Maintenance, Too

No corners, pockets or hidden air passages to collect dirt. Cleaning is the simplest of maintenance operations. Just blow off the dirt with an air hose. Fan and housing design keep cooling airflow tight against the yoke so dirt does not accumulate and cleaning is seldom required.

Factory Lubricated Bearings

Bearings are lubricated at the factory and operate without attention or cost for years. Extra rigidity of the cast iron frame holds bearings in true alignment under all operating conditions. This gives long bearing life and low operating costs.

Get All The Facts

The new *Safety Circle* totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224 to 505. Call your nearest Allis-Chalmers Authorized Dealer or Sales Office for complete information or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6144. A-3228

Safety Circle, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

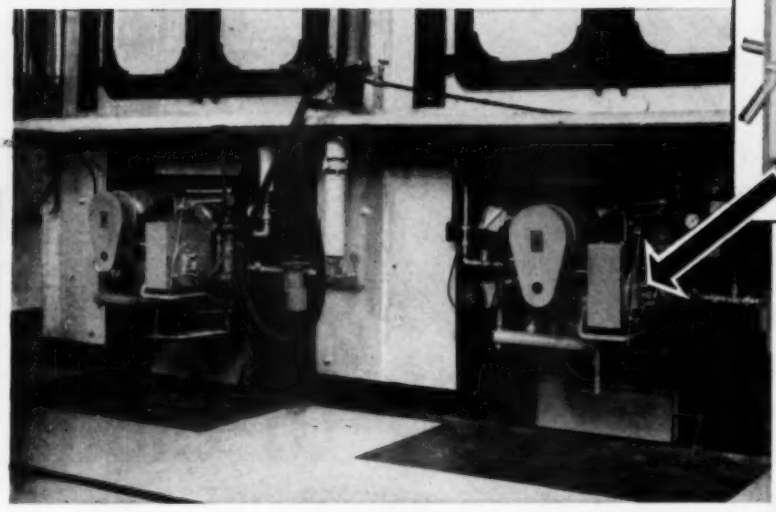
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

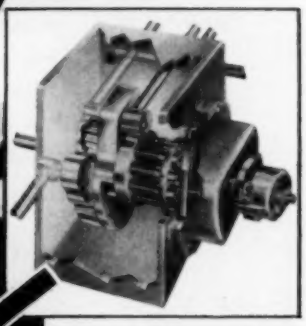
TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ½ in. to 72 in. discharge and up.

ALLIS-CHALMERS

The Modern way to fire heavy oil





Iron Fireman Oil Volumeter *feeds oil in uniform volume regardless of viscosity*

The Iron Fireman Oil Volumeter is a variable volume pump which is completely submerged in the oil reservoir. Multiple pistons operating in a rotating cylinder-block pump the oil to the rotary cup nozzle under *low pressure*. Volume of oil delivered is regulated *accurately* by the length of the piston stroke, which is easily controlled either by automatic control systems or by manual adjustment. Oil feed rate stays within ½ of 1% of setting, regardless of changes in oil viscosity.

Iron Fireman Rotary Oil Burner

fires heavy fuel oils with steady, uniform flame

The Iron Fireman Horizontal Rotary oil burner handles all grades of oil—from lightest to heaviest—with accuracy and precision. The Oil Volumeter meters the oil to the nozzle by *volume*—not by the old-fashioned methods of viscosity compensating valves or adjustable ports. This precision feed results in a steady, uniform flame, even when throttled down to less than 20% of capacity. Dependable oil flow results in thorough reliability even when starting up in a cold boiler.

The heavy fuel oils (Nos. 5 and 6) are lower priced than ordinary burner oils, yet they may contain up to 12% more Btu's per gallon, as compared with lighter oils. Thus, with the precision firing of these heavy oils you save in two ways—in the cost per gallon and the amount of heat obtained per gallon.

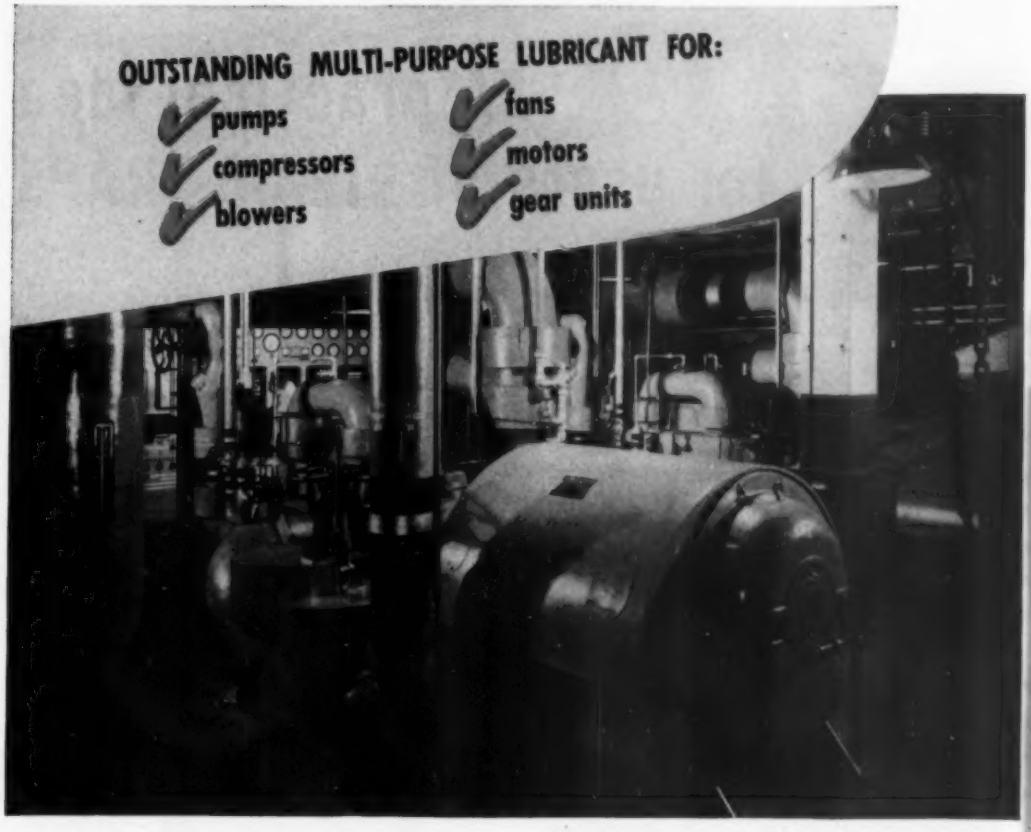
For further information write for new 16-page booklet, "The Iron Fireman Horizontal Rotary Oil Burner." Address Iron Fireman Manufacturing Co., 3136 West 106th Street, Cleveland 11, Ohio. Other plants in Portland, Oregon; Toronto, Ontario. Dealers everywhere.

THE IRON FIREMAN

IRON FIREMAN

AUTOMATIC FIRING EQUIPMENT FOR OIL, GAS, COAL

Cut maintenance costs with Gulf Harmony Oil_



Gulf Harmony Oil is a top quality multi-purpose lubricating oil, ideal for sleeve-type bearings, oil-lubricated ball and roller bearings, hydraulic systems, compressor cylinders, and many types of gears.

Because of outstanding oxidation stability, Gulf Harmony Oil has exceptional resistance to sludging. In force-feed circulating systems, oil reservoirs, hydraulic lines, and antifriction bearings, the use of Gulf Harmony Oil helps prevent harmful deposits, insures fewer oil changes.

Gulf Harmony Oil provides a protective film which has preferential wetting characteristics for metal—displaces moisture, interrupts its corrosive action. Thus Gulf Harmony Oil eliminates rust on all oil-bathed surfaces—particularly important in antifriction bearings operating under damp conditions. And it separates readily from water, reducing the possibility of emulsification.

Its high lubricating value means more effective protection against wear under boundary conditions. Available in a wide range of viscosities.

For complete information on Gulf Harmony Oil and for expert help on any lubrication problem, call in a Gulf Lubrication Engineer today. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

WHY SO MANY LURES?

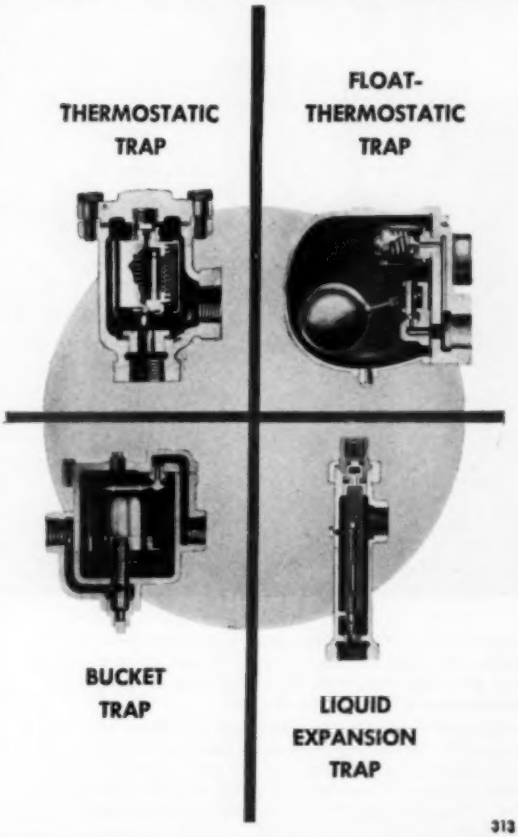
A practical idea for users of STEAM TRAPS

Many readers of this publication can remember when there was only one kind of steam trap and when one trap to a room or a building was enough. As long as the trap "tilted," everybody was happy.

The science of steam trapping has come a long way since then but we still have with us the engineer who tries to "standardize" on one type of trap for the whole plant and the steam man who doesn't realize that the cost of Sarco traps is so reasonable today that it pays to put one on each coil.

One thing is certain. You will need several types of steam traps to lure the utmost out of your fuel and your production equipment. Sarco makes five distinct types of steam traps and is in a position to recommend the right type for each job.

And you can't tell by the cost. An inexpensive type of trap may be the best and the most expensive trap the worst type you could use on any particular job. You can get the right trap the first time for each job by asking the Sarco Specialist near you or writing for our Selection Chart No. 1600.



313

SARCO SAVES STEAM

IMPROVES PRODUCT QUALITY AND OUTPUT

SARCO COMPANY, INC.

Represented in Principal Cities

Empire State Building, New York 1, N. Y.

SARCO CANADA, LTD., TORONTO 5, ONTARIO

ERIE CITY INTRODUCES

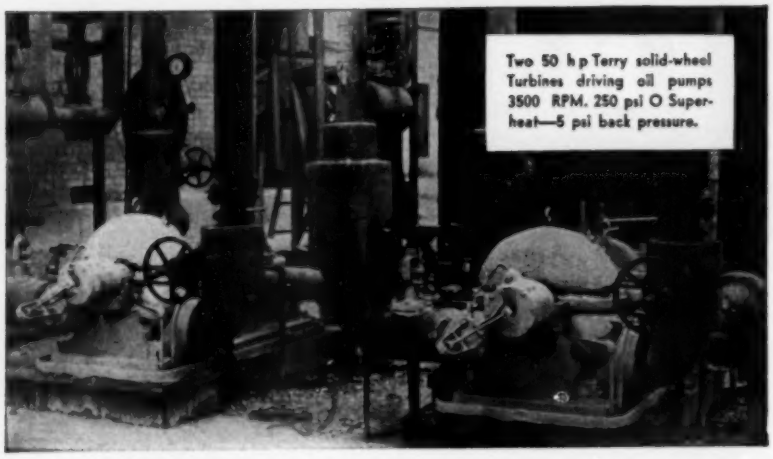
ERIE CITY KEYSTONE STEAM GENERATOR

- A 2-drum water tube boiler + automatic oil and gas burner + induced draft fan + operating and safety controls.
- Gas travels 3 lengths of the boiler—high efficiency with either oil or gas.
- Conservatively rated. Easily cleaned—nationally serviced.
- In 10 standard sizes: 75 thru 600 developed horsepower. Steam working pressure from 150 PSI.

For complete specifications - Write for Bulletin SB-38.

ERIE CITY IRON WORKS *1503 East Ave.* **ERIE, PA.**

TERRY



Two 50 h p Terry solid-wheel Turbines driving oil pumps 3500 RPM. 250 psi O Superheat—5 psi back pressure.

LARGE BLADE CLEARANCES GIVE ADDED DEPENDABILITY

Terry Turbine blades have the protection of generous radial and axial clearances. Axial clearance is so large — a full inch — that end play can do no damage.

Projecting rims at both sides of the wheel give further protection to the rotor buckets. Should clearance become reduced, these rims will take rubbing without damage to the blades.

This construction also makes frequent inspection of thrust bearings unnecessary.

A request on your business letterhead will bring you Terry Bulletin S-116 giving detailed information about these features and other Terry Turbine advantages.

If you have a specific turbine drive job in mind, our district Terry representative will be glad to discuss it with you.

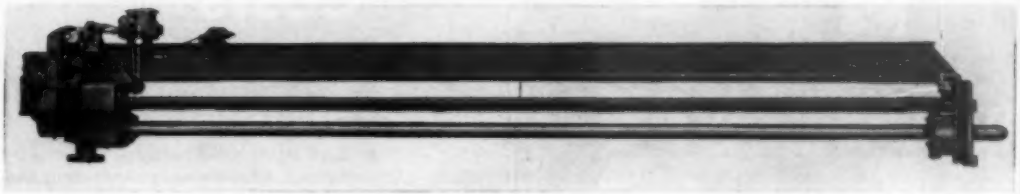
T-1174

THE TERRY STEAM TURBINE COMPANY
TERRY SQUARE, HARTFORD, CONN.

The "LONG" and the "SHORT" of

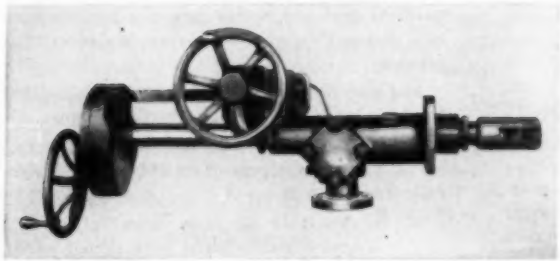
Better Boiler Cleaning--at Lower Cost!

• Here's the LONG of it . . .



Vulcan T-2 Long Retractable Blower, for travels up to 25 feet, is ideal for hard-to-clean surfaces. Lance shown retracted (not in action) for protection against high furnace temperatures, thus cutting maintenance costs. Operated by push button at unit or at central control panel. Install at any angle, indoors or outdoors.

• Here's the SHORT of it . . .



Manually-operated Vulcan HG-1 Gun Type Blower, 12- or 24-inch travel, blasts hard-to-clean deposits from boiler, water wall and superheater surfaces. Air or steam. Easy to operate. Practically no maintenance costs. For automatic operation, use Vulcan RW-1.

Is your soot blower maintenance too high? Is it costing you too much to keep your boilers clean? Then it's time to call in a Vulcan engineer to study your problem. Chances are he'll help you find ways to cut maintenance and cleaning costs materially. His survey will cost you nothing—and could save you a lot of money. No obligation. Just mail the coupon—NOW.

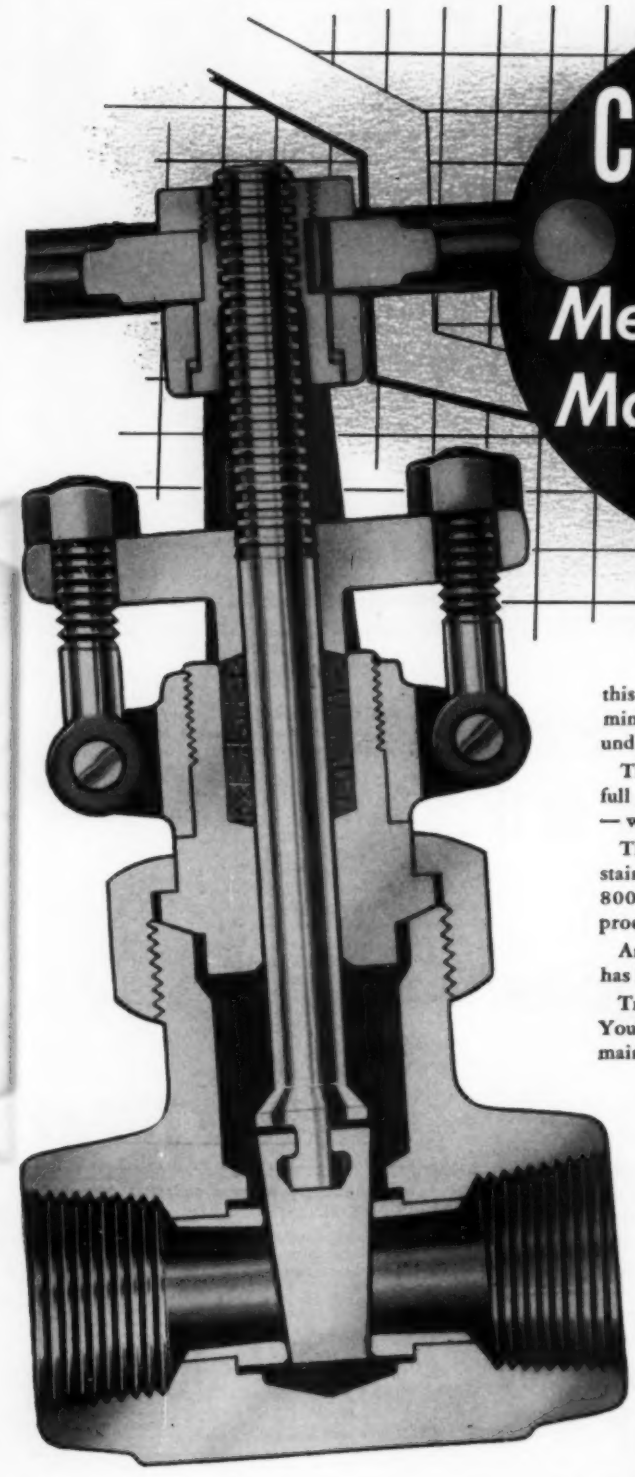
VULCAN SOOT BLOWER DIVISION
Continental Foundry & Machine Company
DUBOIS, PENNSYLVANIA

Mail this Coupon **TODAY**

VULCAN SOOT BLOWER DIVISION
DUBOIS, PENNSYLVANIA

Without obligation to me, please send your engineer to survey our soot blowing equipment and show us how we might cut our boiler cleaning costs.

Name .....
Position .....
Company .....
Street Address .....
City ..... State .....



CHAPMAN
LIST 960
Means Lower Maintenance Costs

Chapman engineers designed this valve with your maintenance problem in mind. They've made it *tough*, so it will stand up under severest service — but *easy* to maintain.

That's why you can repack this List 960 under full pressure. Seat rings replaced quickly, easily — when necessary.

The reason, too, why seat rings are hardened stainless steel and wedge faces are hardened to 800 Brinell by the exclusive Malcomizing process.

And why the stem and wedge gate connection has been made 50% stronger than ever before.

Try it! Make your own maintenance checks. You'll find the Chapman List 960 means lower maintenance costs.

Available in sizes from ¼" to 2". Either metal to metal or gasketed joint, as required. Rising stem with yoke (as illustrated) or rising stem inside screw type. For pressure range 2000 lbs. at 100 deg. F., 380 lbs. at 1000 deg. F. Specify List 990 for higher pressures.

The Chapman Valve Manufacturing Company

INDIAN ORCHARD, MASSACHUSETTS

Timely Comments

Guideposts for Potential Sub-contractors

HUNDREDS of small and medium size Southern and Southwestern companies are going to share the current armament assignment through sub-contracts and sub-sub-contracts and through supplying goods all up the line. On the following page (Industry Speaks), Henry B. du Pont notes that in connection with the Oklahoma Ordnance Works, built and operated for the government by his company during World War II, there were 62 smaller firms that worked on the project as major sub-contractors.

Each of these in turn, sub-contracted some phases of its work to sub-contractors of his own, in addition to which there were hundreds of additional firms from whom purchases of goods and services were made. Du Pont alone placed approximately 25,000 purchase orders for this job.

As noted on this page in the February issue, this subcontracting system is an excellent means of spreading the benefits of large contracts on a broad geographical basis and in a minimum of time. This makes for minimum vulnerability in case of bombing attacks.

Both large and small companies benefit from the system. The large prime contractor needs the specialized techniques of the subcontractor in order to augment his own production program.

The smaller firm can participate as a member of a team in major government programs — programs which he could not handle alone because of incomplete facilities.

NPA Guideposts

The Office of small business of the National Production Authority has given potential sub-contractors a set of nine guide posts to follow in attempting to secure orders from prime contractors.

1. A party seeking a subcontract should first prepare a **general description** of his plant, facilities and location.

2. Next, he should prepare a list of his **equipment** with brief descriptions of the type, kind, size and condition of machines. This information is very important, since a prime contractor will then be able to determine the size and character of the work which can be done in the prospective subcontractor establishment.

3. A statement should be made as to how much **machine capacity** is available. In the preparation of this information, it would be well to describe the products which are now being made or have been made in the past, and if possible, to tell the prime contractor whether plans are to continue and at what rate present products will continue to be made. In other words, the prime contractor will be concerned about the priority a subcontractor will give to the prime contractor's orders. A description of the present or previous products will, of course, considerably assist the prime contractor in determining the type of work which the prospective subcontractor can best handle.

4. A potential subcontractor should tell the contractor what his capacity or **source of new tools** is—or would be, if tools are to be supplied by outside tool shops, it is most important that the prime know where these shops are, because he is interested in knowing the time required to "tool up" the job he is interested in placing.

5. Prime contractors should be told what kind of **delivery facilities** are available. Is a railroad siding near? Can shipment be made by air if required?

6. In selling services to a prime contractor, it would be wise to give a description of your organization and some information on your **key personnel.** Their experience may be a good selling point. Also include the number and kind of employees on your payroll, and any other pertinent information relating to your labor force and the available labor supply.

7. A prime contractor will want to know whether you maintain adequate **cost records**—records which would satisfy government requirements. Can these records be verified by government audit? Will you be prepared to give the government copies of your invoices to your prime contractor? Or invoices from your own suppliers?

8. Prime contractors are interested in the current **financial ratings** of those they are considering as subcontractors. Often a prime contractor may find it advisable to supply you with expensive materials and tools, and before he moves these things into your plant he will want to know something about your financial standing. Any information that you volunteer on this point will be of great usefulness to the prime contractor.

9. Be sure to relate your **previous experience** as a subcontractor if you acted as such previously. Give the names of companies for which you subcontracted and what you produced for them.

Longer service life at lower final cost

with dependable

CRANE VALVES

No. 1610 Diaphragm Valve. Ask for literature on full line through your Crane Branch or Crane Wholesaler.

CASE HISTORY FROM CRANE FILES

PROBLEM: To find a more efficient and economical replacement for plug cocks having an average life of only 2 to 8 weeks in pipe lines handling liquid clay to filter presses.

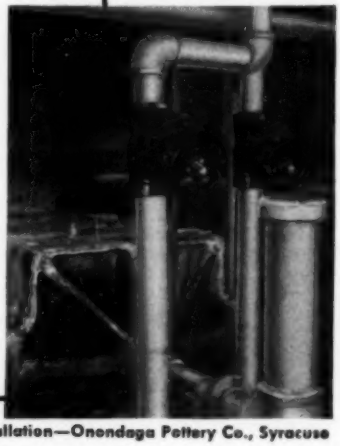
WORKING CONDITIONS: Working pressure 140 psi, with liquid clay flow creating highly erosive effect; also corrosive. Strong tendency to clogging. Operating cycles 5 to 6 per day; relatively quick opening and closing required.

SOLUTION: Crane No. 1610 Diaphragm Valves, iron body, packless design, with separate disc and diaphragm.

RESULT: After 11 months' uninterrupted service, Crane valves showed no significant wear or damage resulting from normal operating conditions. User assured of greatly reduced maintenance and replacement costs over plug cocks. No. 1610 Diaphragm valves approved for standardization on all filter press piping.

Another example of the greater value in Crane Quality, and the lower final cost of Crane Valves for every service. That's why . . .

More CRANE VALVES are used than any other make!



The installation—Onondaga Pottery Co., Syracuse

CRANE

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.

Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Industry Speaks

General Motors and Jack's Body Shop

Adapted from a talk presented by Mr. Henry B. du Pont, a vice president of E. I. du Pont de Nemours & Company, before the recent annual banquet of the Tulsa Chamber of Commerce.

DISSENSION created in the American business machine by false claims that big business gets most of the benefit from defense contracts helps only the enemies of democracy. The industrial system spreads the work "far more thoroughly than the government itself is able to do."

Chain Reaction

Close cooperation between big business and small worked throughout World War II, despite current protests on the "supposed exclusion of the small businessman from defense contracts. Although 75 per cent of the prime contracts went to the 100 largest companies It is not true that this condemned the small businessman to sit on the sidelines and watch the show.

"When a contract is placed with a large company, it really activates an entire chain of operations in which companies of all sizes and all descriptions participate. For every large company that participated in the military program of World War II, there were hundreds who shared the assignment through sub-contracts and sub-sub-contracts and through supplying goods all up the line."

During the last war, the du Pont Company did about one billion dollars worth of military construction and about 56 per cent of that cost went to pay for materials and services supplied by other firms. "We used about 1500 sub-contractors, who supplied services of a type that they could do and we could not."

Cites Oklahoma Operation

In connection with the Oklahoma Ordnance Works, built and operated for the government by du Pont, there were 62 smaller firms that worked on the project as major sub-contractors.

"Each of these, in turn, sub-contracted some phase of its work to sub-contractors of its own, in addition to which there were hundreds of additional firms from whom purchases of goods and services were made. Du Pont alone placed approximately 25,000 purchase orders for this job."

Noting the effort of the government to get contracts to small companies, Mr. du Pont declared that the operation of our American business system spreads the work among small business units far more thoroughly than the government itself is able to do.

"Furthermore, the larger firms, who had the lion's share of the responsibility, did not by any means come away with the lion's portion of the benefits." Government reports show that the small, and middle-sized firms gained a decidedly greater increase in sales, profits and growth than the major companies.

Lots of Rabbits

"What is it that has enabled American industry to continually pull rabbits out of its hat and then achieve a rate of production greater even than that of the rabbits?"

"The answer lies in the conditions under which our industry has developed. Individual freedom has provided the initiative through which Americans have developed their business units to whatever size was required for maximum efficiency in producing what people wanted. Because the demands of the people for more and better goods have grown so enormously, the size of the business units necessary to fill these demands has had to grow as well, so today we have some very large companies—companies which have become known as Big Business.

While it takes big companies with much capital to make such large-scale developments "this by no means excludes the smaller companies—they find their most useful and profitable opportunities in those jobs which can best be done by smaller organizations."

"General Motors and Jack's Body Shop are both in the automobile business but it would be absurd to say that they compete against each other for the same customer's dollar. In fact, if there were no companies like General Motors or Chrysler or Ford to produce automobiles in quantity, there would be no reason for Jack's Body Shop to exist at all."

Esso's New

Lathrop Douglass was architect for the building, with Carson & Lundin, Associate Architects. Guy B. Panero, Engineers served as mechanical engineers and Strobel & Salzman, structural engineer. John W. Harris Associates, Inc., was in charge of construction.

Structure

Six story, 170,000 sq ft Refinery Office Building of Esso Standard Oil Company of Louisiana, Baton Rouge, Louisiana.

Long, unbroken rectangular building form chosen to provide both direct circulation and the most economical structure. Overall length of floors, except the first—336 ft—established by maximum convenient walking distance from elevators.

Vertical traffic handled at center of building by core of three 20 passenger elevators and central stairway. Extra shaft provided for expansion.

Standardization

Complete standardization of interior space—uniform 4 ft module of air conditioning grilles with same 4 ft module for continuous strip windows.

Standard private office depth of 15 ft set up based on economy of space and efficient desk arrangement. The 4 ft window module permitted office widths in multiples of 4 ft.

Continuous windows meant that partitions could be placed anywhere along the 4 ft module and office would still receive maximum light. Air conditioning ducts standardized in same way. Overhead fluorescent lighting is taken off continuous bus duct system from which, in a few moments, fixtures may be removed, changed in location or increased in number.

Movable steel partitions permit maintenance men to change office arrangements completely over the week end—partitions, ducts, wiring, lighting and other services.

Air Conditioning Problems

Louisiana is hot and humid—dry bulb 95 and wet bulb 81 F. Orientation of building fixed by site—main east-west exposures would absorb great deal of solar heat. Soil conditions precluded a basement and structure itself had to be kept as light as possible, complicating location of equipment.

System designed to take care of both heating and cooling. During summer it will maintain 80 F and 50 per cent relative humidity, under maximum outdoor wet and dry bulb temperature given above. During heating season, system designed to maintain dry bulb temperature of 72 F and 30 per cent relative humidity when outdoor wet bulb reading is 20 F. Performance based on chilled water entering coils at 45 F and allowing for maximum rise of 10 degrees.

Air conditioning load lightened somewhat by structural concrete sunshades with overhang of 3 ft, eliminating great deal of solar heat; venetian blinds; and 3-in. spun glass insulation in the roof.

Air conditioning and fan rooms occupy one corner of ground floor and an additional fan room is located near diagonal corner.

Compressors

550 tons of refrigeration is supplied by two 275 ton centrifugal compressors using Freon F-11 as a refrigerant. Each compressor powered by a 300 hp, 2400 v, 3 phase, 60 cycle, 1800 rpm motor.

Capacity of compressors based on condensing water being supplied at rate of three gallons per ton capacity per minute at entering temperature of 87 F. Each compressor cools 700 gpm of water from 54.5 to 45 F when using condenser scale factor of .0005.

Fan Rooms

In each of fan rooms on first floor are three fans and two or three dehumidifiers so arranged to handle east, west and interior zones. Each fan room takes care of one-half the building for all floors except the top, which is serviced by separate system with fans and dehumidifiers located on the roof.

Cooling Tower

Located on roof, but because of relatively low height of building is enclosed so as not to mar ap-

Refinery Office - Baton Rouge, La.

Design Affords Efficient and Flexible Space

pearance. Tower is the induced draft type with red-wood filling and will cool 1650 gpm from 97 F to 87 F when atmospheric wet bulb temperature is 82 F.

Distribution

Sheet metal ductwork runs in the furred ceiling of the corridors with short branches into the rooms. Outlets are the two-way directional type with a volume damper. To conform with 4 ft modules of other building features, these outlets spaced every 4 ft. Arrangement makes possible subdivision of office space into any combination of 4 ft lengths.

Branch connections have adjustable vanes which enable them to obtain required amount of air from the main duct. Return air ducts run through the hung ceilings of the corridors. Registers in the sidewall also take air directly from the corridors to vertical shafts through which air is returned to the proper zone fans.

Special measures for elimination of vibration and noise include flexible hose at all pump suction and discharge connections. Vibration isolators have been placed under all machines with moving parts. Cooling tower and gears are also mounted on rubber isolators with flexible drives to prevent vibration transmission to the building.

Lighting System

Form of plug-in busway was only system sufficiently flexible to meet changing needs. It allowed movement or increase of fixtures as needed without wiring changes. Fixtures merely have to be attached to continuous plug-in busway by simple hooks and the electrical connection is effected by a "twist-out" plug.

Busways run along the finished plaster and are generally recessed in the acoustical ceiling. They are spaced on 7 ft centers and run length of building. On a typical floor each side section will have two busways, each middle section three, and each corridor one.

Lighting Fixture Controls

Power for Esso's refinery installation is purchased in large quantities from an adjacent utility plant and carried over Esso's own distribution system. Hence power costs are low. Lights, controlled from push-button stations near panel boxes in corridor, are turned on at start of the working day and remain on until everyone has left. If fluorescent tubes are turned on and off frequently, their life decreases considerably. Tube replacement costs would be higher than additional wattage consumed by letting lamps burn all day.

Wiring

To complete flexibility requirements, wiring for telephones and outlets for office machines had to be adaptable to change. This was accomplished through use of a cellular steel flooring system.

One duct in the floor is used for branch circuits (120/128 v) and the other duct is used for telephone and low-tension (signal) wiring. Underfloor wiring will not interfere with the movement of partitions and new outlets can be installed and old ones closed within a short period of time. Cross headers were located so as to be readily accessible to any of the possible changed layouts.

Electrical Distribution System

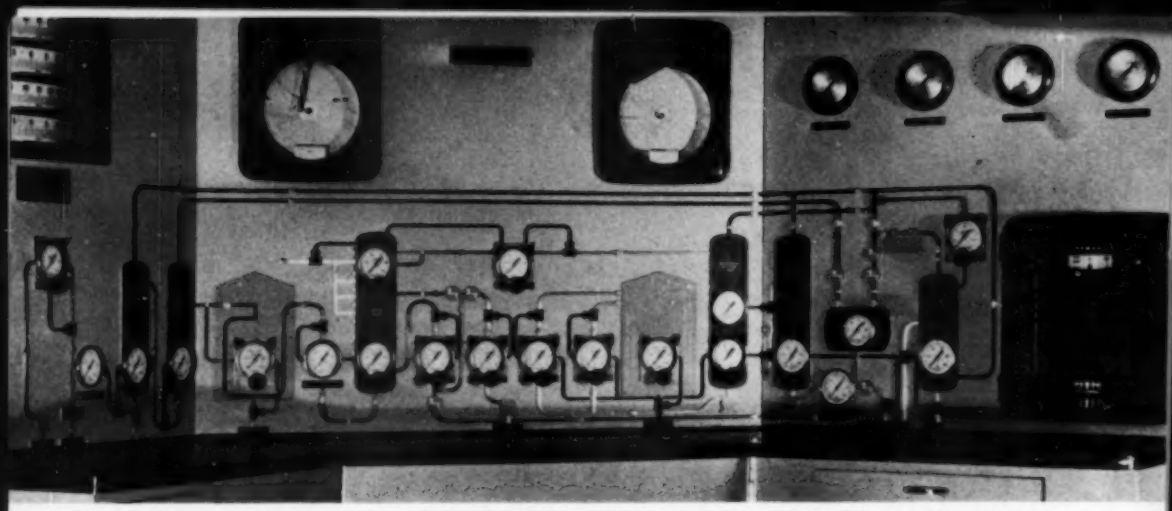
System made use of feeder type busways instead of the usual conduits and wiring. Power obtained from refinery's primary distirbution system at 2400 v, 3 phase, 60 cycles.

From terminal point, one feeder carries power to two 300 hp compressor motors. Second feeder carries power to a unit substation, where a three-phase dry-type transformer steps down voltage to 460 v for distribution through building.

From first floor transformer room two busways carry power through building. One goes through north riser shaft to fan room on roof; the other up through south riser to the fan room. Fans, elevators and other equipment use 460 v. Voltage is reduced to 120-128 v by dry-type transformers for lighting, office outlets, etc.

Distribution system using busways proved to be more economical than conduits and wiring. Busways are easier to install and require less maintenance than conduits and wiring, and less auxiliary equipment is needed. It is estimated that a saving of 15 per cent was effected by using busways.

Another feature of the busways particularly in keeping with the design of the Baton Rouge Building was the case with which existing loads could be relocated if necessary. Take-offs can be readily made and in the event of a major change, busways can be dismantled and re-installed with almost complete re-use of material.



THE GRAPHIC PANEL PRESENTS A CLEAR CONCISE PICTURE OF THE PROCESS UNDER OPERATION IN A MINIMUM OF BOARD AREA. IT ALLOWS RAPID, CLEAR INSTRUCTION TO NEW PERSONNEL—BOTH OPERATING AND MAINTENANCE.

Automatic Instrumentation with Graphic Panels

By A. V. Novak E. I. du Pont de Nemours & Co., Sabine River Works, Orange, Texas

RECENT years have seen a rapid increase in the use of automatic instrumentation in the field of continuous process control. Due to the increasing demand of quality control, the increasing complexity of processes, and the growing need for manpower conservation, the automatic controller has been extended to monitor more and more points in the modern processing plant.

With the increased demand for further monitoring and for the automatic control of processes both difficult and dangerous to handle manually, the controls have been taken from the field and put in a central location.

The first step consisted of collecting controllers in a central spot. Formerly, controllers were located in the field with locally mounted panels, in the proximity of the process or variable to be controlled. As more and more of these points were developed the desirability of consolidating these to a central point became apparent. Hence, the so-called central control board was developed.

Further developments of the central control board made it occupy an entire side of a room, an entire corner of the room, and finally an entire room. Coupled with safety measures, such as requirements for Class 1 Group D locations and new developments in the atomic field, the growing central board has found its place in a wholly separate building.

Each of these steps followed logically and each was an economic move over the preceding one. There comes a time, however, when one must step out of the traditional way of development and approach the problem differently to see if there is a better way of solution. In the case of the central control panel, the motivating influence of design was simplicity of operation and simplicity of maintenance.

All points in the control system were brought to a central point to make it handy for an operator to carry on the work of the process. The central control board has now grown to somewhat larger proportions and it is now frequently so large that the simplicity for which it was originally created has disappeared.

It is performing a much larger job than was ever dreamed possible, but nevertheless, from the standpoint of the shift operator, who roams up and down a 100 foot panel, simplicity is hardly its correct title.

It is hardly necessary to point out the desirability of being able to train an operating man in a control room in a minimum of time or the necessity of avoiding confusion during routine operation. Therefore, any move which lends itself to reduction of confusion and increases the directness of approach has definite economic possibilities.

Console Control Board

Toward this goal an increasing number of instrument men and instrument companies have been doing constructive thinking and designing along the lines of a console control board. This control board takes its name from the familiar console organ and in practice serves a similar purpose. In a console all the control variables are placed within easy reach of the operator seated at the center of the console. All control mechanisms are remotely located and only the records and means of moving the control points are brought to the console. The records are placed on multipoint instruments, thus allowing many records in a small space.

This method consolidates the control data and adjustments to a single location and relieves the operator from running up and down a 100 foot control board to make

settings. This is a great asset during times of upset and start-up. In some respects this arrangement may aid in consolidating a picture so necessary in today's continuous process.

More and more engineers today are thinking in terms of an entire process and its inter-related functions rather than individual pressure, temperature and flow controllers. Toward this end the console has reduced the physical movements required in large and long panel boards but it carries the objection of increased confusion that exists with the consolidation of many uniform looking controls and adjustments in a small place. With many records closely located the possibility of mistakes has increased. Many remote set points are located closer together, thus making mistakes possible—especially on that ever blamed night shift.

Graphic Panel

To obtain the advantages of reduced panel space obtained by the console with remotely located controllers and to gain the simplicity of a direct, non-confusing arrangement, the flow sheet type of panel board is making its bid for consideration. The flow sheet board, or as it is more commonly known, the graphic panel, is not a new invention in itself.

The power industry has used the graphic panel in modification for some while. In that industry, just as in the chemical industry, the complexity of many related switches became so great that some means of simplification was necessary to avoid error. The power industry uses the graphic panel by laying out an entire picture of a distribution network with relay switch handles in exactly the same spot that a power disconnect may appear in the field. This in connection with indicating lights aids the power dispatcher in making proper connection for remote switching operations.

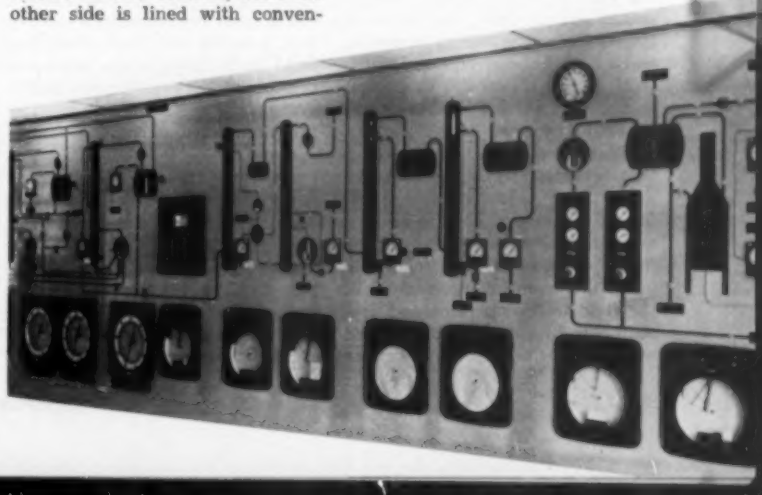
Coming a little closer to the chemical industry one has only to look at the Houdry process panel to find another approach to the graphic presentation of control information. The Houdry board is best described in terms of a supervisory board in that it indicates to the operator what has happened in the process and aids him in keeping current with the automatic process occurring in the plant. Usually such a board is on one side of the control room, while the other side is lined with conventional controllers. Such a system actually increases the size and cost of the control room, but it does serve a useful purpose in providing a graphic indication of existing conditions. Again note should be taken of the desirability of simplicity and aid in furnishing information to the operating man to insure that a correct job is done most efficiently.

Design Features

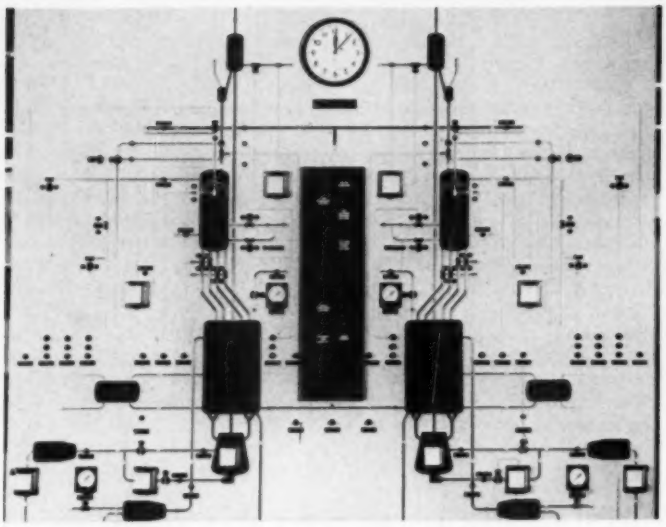
In the most recent version of the graphic panel, the process under control is drawn out in diagrammatic or graphic form on the side of the control room. The use of color is important in keeping streams identified. Emphasis should be placed on the fact that the pictures and the colors are not used for decorative purposes.

Nothing should go on the graphic panel except those things which lead toward simplicity and directness of approach. The use of standard and simple symbols should be used throughout. At each location in the actual plant where some type of control is used, a small unit is installed in the flow sheet which serves a multiple pur-

More thinking in terms of an entire process rather than individual pressure and temperature . . . simplification with graphic panels avoids errors . . . development of panels, local boards, central control rooms and consoles . . . advantages and disadvantages . . . cost and space comparison with conventional boards.



A GRAPHIC PANEL GIVES INDUSTRY A POWERFUL TOOL FOR THE CONTINUOUS OPERATION OF COMPLEX PROCESSES. IT IS MORE THAN A MERE "FLOW SHEET" PHOTOGRAPH TRANSFERRED TO A PANEL. THE OPERATOR, STANDING BEFORE A GRAPHIC PANEL, CAN VISUALIZE THE CONDITIONS THROUGHOUT THE ENTIRE UNIT. WHEN CONDITIONS CHANGE, OR EQUILIBRIUM IS DISTURBED, HE TRACES THE DISTURBANCE THROUGH THE WHOLE PROCESS, AND TRULY OPERATES THE PLANT AS A UNIT.



THE POWER INDUSTRY HAS USED GRAPHIC PANELS IN MODIFICATION FOR SOME TIME. THE COMPLEXITY OF MANY RELATED SWITCHES BECAME SO GREAT THAT SOME MEANS OF SIMPLIFICATION WAS NECESSARY TO AVOID ERROR. NEW INSTALLATIONS AND REVISIONS IN PROCESSING PLANTS SHOULD BE CAREFULLY STUDIED IN VIEW OF WHAT THE GRAPHIC PANEL MAY DO FOR THE PROPOSED SYSTEM.

pose. This unit has on it a dial with several knobs. Although several variations are available on the market today, the usual design calls for a space about 4-in. square on the panel.

All units have a dial which gives a continuous indication of the process variable under control, be it temperature, pressure, flow, or etc. By means of knobs and switches one can indicate the control valve air pressure loading and the set point. There is also a means of switching from automatic to manual control. In most cases the actual control mechanism is located on the job near the point of measurement where the conventional transmitter is usually located. The operator has then before him a continuous indication of the process, a continuous indication of the set point, indication of the control valve loading pressure, and a means of conveniently transferring from automatic to manual and back to automatic without upset to the process.

What in fact has happened is that when a process became so large as to make it impractical for an operator to physically open and close the various valves in the field a device was made to bring the essential information of the field to the operator and present it to him on a control board which has the exact appearance of the process in the field. As an operator would normally reach for a valve handle to make a temperature adjustment in the field, he now reaches for that same valve in the same line as depicted on the graphic board and makes the same adjustment.

Controller Location

As previously pointed out, the controller is usually located in the field at the point of conventional transmitter location. Extended work has been done on the merits of close coupled control systems which result in a minimum of transfer lag. The merits of such a system have definitely been proved for processes of short time constant. In this category falls flow, pressure, ratio and possibly some temperature control systems. Field tests have actually proved that a much narrower throttling band and faster reset rates are possible with close coupled control systems by virtue of reduction in the time constant of the control system.

Another objection quite frequently pointed out in connection with field mounted controllers is that of inconvenience to the maintenance man when doing repair work on the controllers. The desirability of performing repair work in air conditioned control rooms versus that of field mounted controller certainly has merit. However, most modern installations use transmitters which have to be located in the field. As such, the addition of a controller to the transmitter usually does not add too much in the way of field maintenance. The advantage of housing controllers centrally versus the advantages of close control loops must be weighted and the decision for final location made accordingly.

Instrument Maintenance

In connection with maintenance of graphic panel type instruments, a somewhat different approach should be made for most efficient operation. With conventional instrumentation, maintenance was of necessity performed in the control room on the particular controller in question. With the unitized type of instrumentation made possible by the graphic panel, this is changed to some degree, since all controllers and board mounted indicators are identical regardless of their service. A greater degree of interchangeability is possible. By maintaining not over six different units, essentially the entire system can be interchanged and repairs can then be made in the shop where proper facilities are available for a standardized type of maintenance. This, of course, has reference to the type of maintenance one would normally do under preventive maintenance or breakdown maintenance. During the time of turn around or complete plant shutdown for overhaul, this system has its limitations due

This article was adapted from a paper presented by Mr. Novak at the Fifth Annual Session of Instrumentation for the Process Industries, Texas A & M, College Station, Texas.

All illustrations were furnished by Panellit, Inc., Chicago 26, Illinois, manufacturers of prefabricated instrument and control panels.

to the objectionably high number of spare units which would be necessary.

Process Records

The present system calls for an indication of the controlled variable in the field by means of a pressure gauge, as well as an indicating dial on the graphic panel. If a record of these variables is desirable, a multipoint recorder is located on a separate board in the control room. Various ramifications of this recorder location have been tried. In some cases they have been located at the bottom of the panel; in other cases, intermingled with the graphic features of the board. Again, each application has to be reviewed with individual merits applying. It should be pointed out that in actual operation of such a board the records are usually not used for routing operation. They are used for indication of trends during start-up and for indication of trends during an upset. Records are useful for review by supervisory personnel for performance during the two night shifts.

There is available on the market today a small strip chart recorder that will fit into the spot on the graphic panel in place of the conventional miniature panel which has only an indicating dial. There are various arguments pro and con for the advisability of such a miniature recorder. In addition, various signal lights or even motor start-stop stations may be placed on the board for the various pumps and motors. In so doing, however, the three main goals of the graphic panel should be kept in mind—simplicity, compactness, and directness of operation.

Graphic Panel Changes

One of the most frequently presented charges against the graphic panel is that of inflexibility. It is charged that when revisions of the graphic panel are to be made, difficulty will exist in changing the face of the panel. This charge does not seem justified when one analyzes what happens in the conventional panel when alterations are necessary.

In the conventional panel one has the entire side of the control room lined with controllers, each occupying roughly an area about 18" x 18". When an alteration is necessary, the removal of large type instrument cases is involved. Usually cases of different size and shape are needed and cutting and/or welding of the panel board is necessary to accommodate the new case shape. This is what is necessary when an existing installation is changed to another function, such as, converting a base pressure control on a column to a temperature control. In almost all cases where a different case shape results, a tedious alteration to the panel is involved.

If an addition is involved, such as the addition of another column or instrumentation on a preheater that was not formerly allowed for, the problem of finding a 2 foot square area on the panel for a controller presents a problem.

One has two choices—that of installing extra pens and controls on existing instruments or moving down to the end of the board and installing the instrumentation for the new addition in a very illogical location in relationship to the rest of the process. This remote location has actually been done in several cases. It can be seen that the alteration of the conventional board presents quite a problem.

Now let us examine the graphic board to see what complications are encountered when changes are necessary. In the case of changing functions, such as changing a base pressure control to a temperature control, the change can be performed quite readily since all miniature panels are interchangeable irrespective of function. Quite frequently the same miniature panel can be left in the same location with minor changes to the symbolic piping on the panel.

Modern graphic boards today do not use painted lines on the surface but metal or plastic lines that are affixed to the board in relief. This method makes changing of the lines considerably easier than those systems requiring a paint job. In the case of additions to the existing board a somewhat more difficult problem is presented. If the addition is a minor control addition, such as a temperature control on a preheater or a pressure

Graphic Panels

Advantages:

1. A unitized picture of the process to the operating man.
2. Consolidation of control variables in a central area, but not as consolidated as the console.
3. The reduction of panel board space.
4. Reduction of size and cost of the control room.

Disadvantages:

1. Increased decentralized location of control mechanisms.
   Compensated for by the increased control performance of close control loops. Also places the controller in the primary transmission line, thereby eliminating the number of mechanisms through which a signal must go before it reaches the controller proper.

2. Increased effort necessary in having throttling band and reset adjustment decentralized. This is especially irksome during start up.
   Admittedly a somewhat troublesome problem. After start-ups however, adjustments of these variables should occur very seldom. Some engineers point out that the location of these adjustments at a remote point will reduce unauthorized tinkering. This point is definitely a two-sided question and there are equally as many engineers branding this an advantage as there are those who consider it a limiting factor.

3. Increased number of transmitter lines.

control on a surge vessel, sufficient space on the panel can usually be found for a miniature panel. If the instrumentation of an entirely new column is necessary steps such as relocation of the board or addition at the end of the board will be necessary. This last step admittedly is an expensive venture but is no more so than that involved in a conventional type of instrument board. From this it can be concluded that graphic panels are actually easier to convert than the conventional type of control board.

Installation Cost

The cost of installing a graphic board is a topic which has received much argument in the recent year. Some engineers maintain that they have experienced a higher cost than for the conventional board, while others state the cost is lower. Actually, both are correct.

If the graphic panel is loaded with a large amount of gingerbread and decorative devices, the graphic will probably exceed the cost of a conventional panel as it is probably doing a larger job. If, however, the graphic is designed with the prime purpose of simplicity and directness of purpose with a reasonable spread of units for maximum useability and minimum board length, the graphic will usually be more economical in board lengths exceeding approximately fifteen feet. Again this is merely a rule of thumb, and various complexities enter into the picture and one must be extremely careful to compare equivalent pieces of equipment.

For example, it is unfair to compare a graphic panel with all functions being transmitted to the board with a conventional panel where no transmission is used. The argument of transmission versus direct meter lines is not one to enter into the pros and cons of the graphic board. That argument must be settled on its own merits. Actual installations are known where a saving of 20 to 30 per cent in installed costs has been realized by the use of graphics over conventional panels.

Thus far we have been speaking of new installations only. The graphic panel has untold advantages when one has to alter existing conventional controls in limited areas. In such cases one can make additions or alterations by means of graphic panels without the addition of more control room area. Frequently this would be highly expensive and in some cases entirely impossible or impractical due to present location of buildings and equipment. In such cases the cost saving becomes extremely high in favor of the graphic panel. Again, as a rule of thumb, a graphic panel can be built into approximately 50 to 60 per cent of the panel board space required by a conventional control board. Installations have been known where the installation has been crowded into approximately 25 per cent of the conventional panel space. This, however, becomes extremely crowded and the simplicity for which the graphic panel was designed is lost. Extreme care should be taken not to attempt any installation that will result in a crowded and jumbled board.

The chief sources of saving realized from a graphic panel come from the following:

1. Decrease in board length
2. Decrease in control room area
3. Decrease in operating personnel due to the smaller board area that needs monitoring
4. Decrease in maintenance time resulting from the unitized construction of this type of control board, thus allowing for shop overhaul of the various units
5. Decrease in down time or "off of automatic control" time resulting from a faster overhaul of instruments made possible by the interchange of units rather than the prolonged maintenance in the field on a conventional type instrument

The graphic panel presents a clear concise picture of the process under operation in a minimum of board area. It allows rapid and clear instruction to new personnel—both operating and maintenance. It does all these things at a financial advantage in most cases.

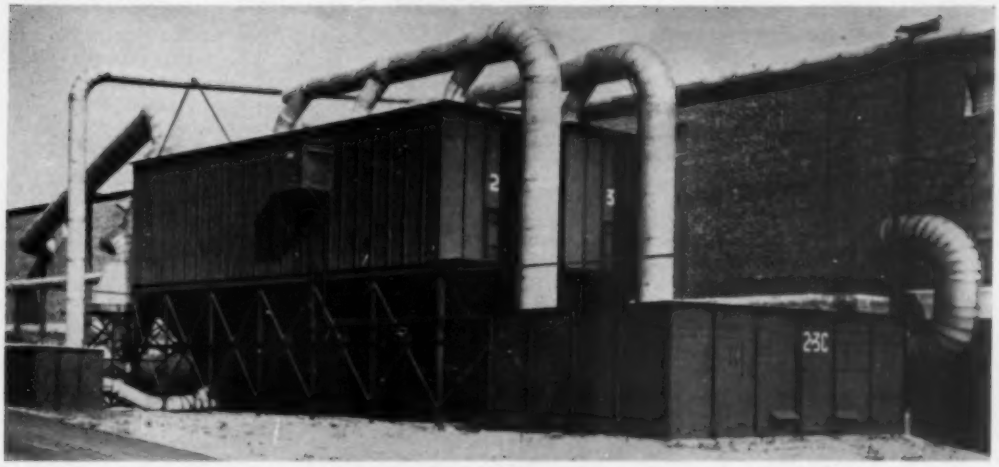
Houston Industrial Show Opens March 11th

Houston's **International Industrial Exposition** opens at the Coliseum March 11th, with exhibits and activities covering oil field operations, chemical industries, refining, and general industrial projects.

The above view of last year's exposition shows a partial view of exhibits designed to provide a means for men in Southern and Southwestern industry to see and study equipment for their own particular use.

The Annual Engineering Show of the University of Houston will be held concurrently with the Exposition, March 11-17th. Mechanical, petroleum, electrical, civil, architectural and chemical departments of the university will have individual exhibits.

The International Industrial Exposition will not be open to the public. Complimentary tickets can be obtained by Southern and Southwestern industrial plant men by writing Mr. E. G. Lenzner, General Manager, International Industrial Exposition, 41 San Jacinto St., Houston 2, Texas.



DIXIE MANUFACTURING COMPANY'S DUST COLLECTING SYSTEM AT THE SOUTHERN SHUTTLES DIVISION OF STEEL HEDDLE MANUFACTURING CO., GREENVILLE, S. C.

Filter System Saves Treated Air —

Dust collecting system permits removal of large quantities of sawdust from 80,000 cfm of air and return of heated and treated air to plant.

SOUTHERN Shuttles Division of Steel Heddle Manufacturing Co. is the world's largest producer of metal-tipped shuttles used in the textile industry. In the new plant near Greenville, S. C., over 300 employees operate batteries of saws, sanders, planers, and shapers in cutting the shuttles from wood blocks. These processes produce large quantities of sawdust which is carried away through an exhaust duct installed above each machine.

Problem

This constant exhausting of air from the plant keeps the air free of dusts, but in order to produce good shuttles, the humidity in the plant must be controlled, and in winter, air must be heated. Treating this air is expensive. If it were exhausted to the outside at the rate required to remove the sawdust, it would be economically impossible to maintain properly conditioned air. Removing the sawdust requires air at the rate of 80,000 cfm.

The answer to the problem was found in a filter system which removed the dust from the exhausted air and then permitted this same air to return to the plant for reuse, losing in the process little of its heat or humidity. Recirculation of air in a conditioning system is common, but seldom is it seen on such a large scale with such dust-filled air.

J. J. Kaufmann, Jr., vice-president of Southern Shuttles, credits Dixie Manufacturing Company of Baltimore, Md., with designing, engineering, and installing the dust collecting system which solved the problem.

Design Features

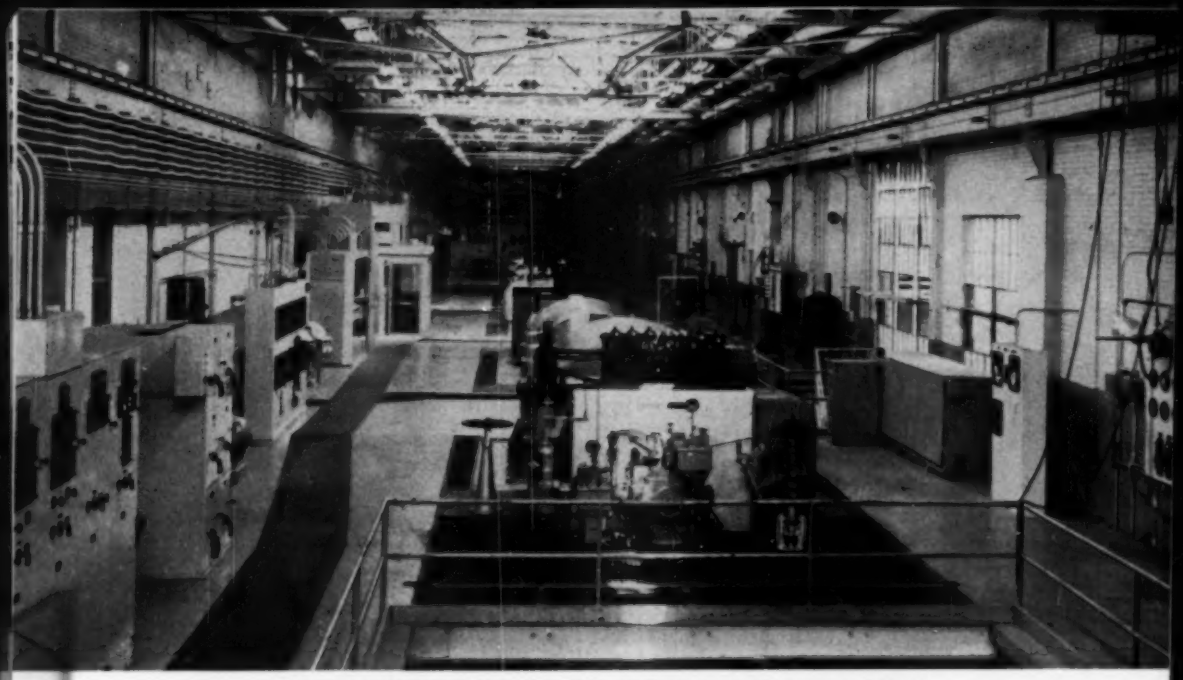
A major factor in the successful operation of the system is the manner in which a balance of atmospheric pressure is maintained between the dust removal and the air conditioning systems. Humidistats and dew point recorders are incorporated into the system so that the filtered air removed from the plant is fed back into the building or released outside in direct relation to conditions within the plant. These devices are completely automatic in operation and require little attention or maintenance.

An unusual feature of this installation is the use of a "classifier" instead of the conventional "cyclone" collector to remove heavy dust particles ahead of the cloth filters. An expansion chamber in the suction line ahead of the filter permits heavier particles to fall out before the air reaches the cloth tube filters.

Fine particles are removed in the self-cleaning tubular filters, the air being drawn through them by constant speed fans.

The sawdust, chips, shavings, and other wood particles collected in the system are conveyed to the plant boiler room or to storage for use as fuel.

In the first winter with the system in operation, it was possible to maintain good conditions of humidity and temperature within the plant while keeping the air free of dust. It has demonstrated that its maintenance cost is low, and all indications are that it will offer many years of satisfactory service.



TURBINE ROOM OF THE UNION BAG & PAPER CORPORATION, SAVANNAH, GEORGIA

New 1200 lb Steam Units at

By H. R. Arnold, Power Engineer, Union Bag & Paper Corp., Savannah, Georgia

Initial steam pressure above 600 pounds may advantageously be considered in processing industries where the electric power requirement is reasonably high in relation to process steam.

THE purposes of a power plant in a kraft paper mill are: First, to supply large amounts of steam for processes at the required process pressures, utilizing all steam generated from black liquor recovery and bark boilers, and supplementing with purchased fuel firing as required; second, it should generate all the electric power required for the mill without frequency variations at the lowest possible cost—exhausting a minimum amount of steam to the condensers, consistent with good operating practice.

Electricity, therefore, is considered as a byproduct, and its generation is accomplished by generating steam at an initial steam pressure and temperature in excess of any steam pressure or temperature required by the processes. This steam first passes through sections of the turbines to generate electric power and then discharges through extraction ports or exhausts to process steam lines at the required pressure conditions for production.

Power plant equipment is customarily expected to be serviceable for 15 or 20 years, and it is a relatively simple matter to design a power plant to meet the requirements of a mill when all the factors are known. However, experience has taught us that once built, a paper mill does not continue to operate at designed conditions. The trend toward greater paper machine speeds, higher steam pressure on dryer rolls, etc., very quickly upsets the steam and power balance, and economical operation of the power plant is sacrificed for greater production. It is very important, therefore, that the design of equipment be versatile enough to meet anticipated combinations of steam pressures, steam flows, and power requirements.

During the past ten or fifteen years, kraft mills in particular have been striving for greater speeds on their paper machines without increasing the number of dryer rolls. In order to effect proper drying of the paper, extraction or exhaust pressures on non-condensing turbines have been increased, or thermo-compressors were installed to obtain the higher steam pressures and dryer surface temperatures. The result has been overloaded turbines and frequency variations affecting the operation of the paper machines and upsetting the steam and power balance. These are not hypothetical conditions; they were prevalent dur-

Union Bag & Paper - Savannah

ing the rapid growth of Union Bag & Paper Corporation, and this case is not without parallel.

In 1944 we installed a fourth double extraction condensing turbine rated 7500 kw at 0.8 pf designed to operate at an initial steam pressure of 400 psig 725 F total temperature, extracting at 145 lb and a range of 40 to 80 lb back pressure. This turbine was equipped with an oversized condenser to force a balance and relieve badly overloaded condensers on two of the three existing turbogenerators. The use of 80 lb extraction steam from this turbine replaced the 45 lb steam which had been used on our board machine. A 200,000 lb per hr boiler was also installed at this time.

There were the conditions existing in 1945 when a fifth paper machine was being considered. It became apparent from our studies that the installation of another paper machine would necessitate either the addition of power generating equipment or the purchase of power from the local power company.

The installation of a fifth paper machine was assured by mid-year of 1945 and studies were continued to determine how to meet the additional demand for steam and power most economically. Condenser steam loads approximated 90,000 lb per hour under existing conditions when averaging a production of 861 tons of finished product daily. In addition to a fifth paper machine, we planned to enlarge our bag manufacturing facilities and also build a box plant with two corrugating machines. This new paper machine was expected to increase our production to an average of 1,085 tons of finished product daily, and a survey was made to determine the power and steam required for this rate of production. Process steam and power requirements were calculated to be:

Steam per hr to produce 32,250 kwh per Hr	
400 psi	27,000 lb.
170 psi	50,000 lb.
145 psi	165,000 lb.
70 psi	120,000 lb.
45 psi	385,000 lb.

A steam and power balance was prepared to determine if this production could be maintained with the existing equipment and it was found that by operating the four generators at maximum output and purchasing power, the demands could be met by purchasing 3,250 kw per hr.

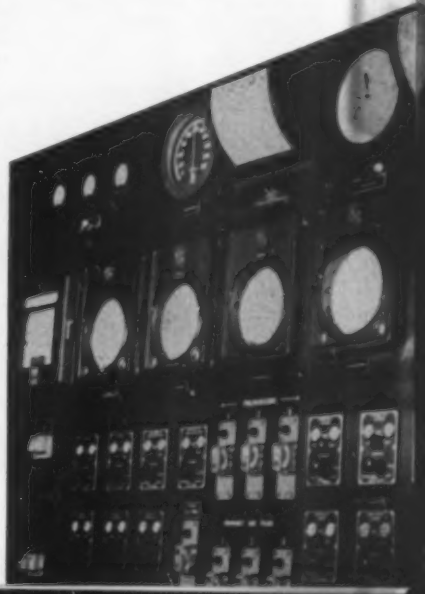
Calculations were then made to determine what effect the cost of purchased power would have upon the combined cost of all electric power. We found that the added cost of purchased power, amounting to approximately $20,000 a month, would increase the total cost per thousand kilowatt hours distributed by 51 cents or 16.7 per cent.

By this time it was evident that with fuel costs at a record high, efforts should be made to bring the power and steam loads more nearly in balance by installing additional power generating equipment to maintain the lowest possible cost. With a condensing load of 80,000 lb per hour and a purchased power requirement of 3,250 kw, this represented the equivalent of an 11,000 kw condensing load when operating at an initial pressure of 400 psi and 725 F total temperature.

The logical method of correcting this condition would be to install a high-pressure topping turbine exhausting to our 400 lb steam system. And knowing the expected requirements at proposed production rates, our studies indicated that we could most nearly approach a steam and power balance by using steam at a pressure of 1,250 lb, 950 F and a 7,500 kw topping turbine exhausting at 400 lb back pressure.

Further studies, however, indicated that while a straight topping turbine of this type would meet our immediate requirements, any further increases in production would present a more serious problem. Our process steam requirements would then exceed the combined extraction flow rates of the low pressure turbines at either the 145 lb or 45 lb level. So our decision at that time was to strengthen the 145 lb process steam system by using a high-pressure single extraction back pressure turbine rated at 10,000 kw, extracting at 400 lb and exhausting at 145 lb, with a boiler rated at 315,000 lb of steam per hour.

Installation of this 10,000 kw turbine would enable us to generate all needed power, reduce the load on the older generators and meet all process steam requirements with some reserve. This would also reduce our total steam generating load by 51,000 lb per hour. Power generating costs were calculated when operating under



VIEW OF BOILER CONTROL AND INSTRUMENT PANEL.

this condition to be $1.35 per thousand kilowatt hours less than when using the existing equipment and purchasing the required additional power. On the basis of a 350-day operating period, the calculated annual saving was in excess of $400,000.

By early fall of 1946 an order was placed for a 10,000 kw turbine to be operated under these conditions, but this order was later cancelled. In the interim, the fifth paper machine was installed and placed in operation in October 1947. A substation having a capacity of 5,000 kw was erected and equipped to obtain power from the local power company, and blocks of power were segregated from our distribution system to be operated on the purchased power.

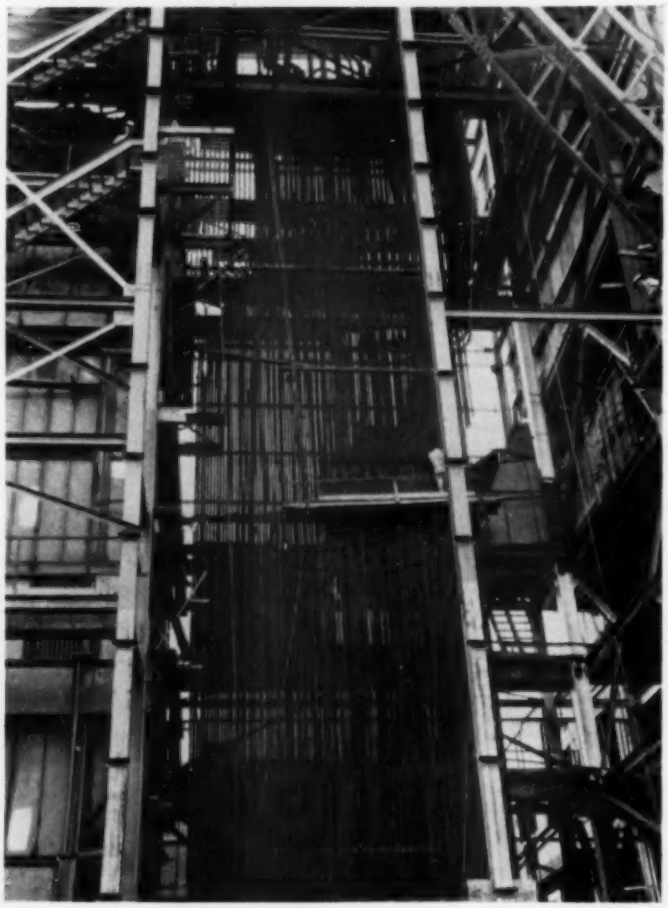
We continued to study the power and steam requirements on production rates up to 1,600 tons of finished product per day. By November 1947 it was decided that we would proceed with the high-pressure installation, but we would also install a new set of evaporators and a 350-ton recovery boiler in the pulp mill. This program also called for the use of 75 lb steam on the dryers of No. 5 Paper Machine, and this change made it necessary to reconsider the exhaust pressure on the new turbine.

To obtain 1,600 tons production, six paper machines would be required and at this rate of production we calculated a total power load of 48,500 kw and 1,170,000 lb of steam per hour. To provide the maximum flexibility and the greatest economy the additional power should be generated on two 7,500 kw single extraction, back pressure turbines, extracting at 400 lb and exhausting in a range of 40 to 80 lb.

At the conclusion of our studies, two 7500 kw extraction or admission type turbines and a 520,000 pound per hour 1425 psi, boiler were ordered. The details on these units and associated equipment are shown in the accompanying tabulation of principal equipment.

Installation of one turbine was completed in the early fall of 1949, the second turbine having been cancelled. This unit was placed in operation in November on 400 lb steam, which relieved us of the need for purchased power, and generated 5,000 kw while operating on this condition. By January 14, 1950, the boiler was ready and placed in operation. During the initial startup of the boiler, we were able to shift from 400 lb operation to high-pressure operation without taking the turbine out of service. This feature was particularly desirable because it enabled us to change over from high to low pressure steam or from low to high pressure steam without affecting mill operation, or purchasing power in the event the high pressure boiler was removed from service for any reason. Operating curves for this unit are shown in the accompanying illustration.

GENERAL VIEW OF SOUTH WATERWALL DURING CONSTRUCTION



Feedwater

The feedwater to the boiler is composed entirely of paper machine, evaporator, and turbine condensate which is first preheated in an open-type deaerating feedwater heater operating at 45 psi and floating on the 45 lb steam system which insures a constant feedwater temperature regardless of the rate of flow to the feedwater pumps. The purity of this condensate is vitally important and is therefore under constant attention. A series of cells are used through which samples of condensate from the various sources flow continuously, and an indicating and recording conductivity instrument provides the operators with a visual indication and a record of the conductivity in micromhos. Whenever the conductivity of condensate from a source of supply

Principal Equipment

Steam Generating Unit — Union Bag & Paper Corp., Savannah, Ga.

Boiler .....1—Babcock & Wilcox, radiant type, 520,000 lb per hr. Design pressure 1425 psi, operating pressure 1250 psi at superheater outlet. Fires Bunker C oil or natural gas and is arranged for future use of pulverized coal.

Superheater .....1—Babcock & Wilcox, 3 stage: Pendant—two stage, Horizontal—one stage.

Air Heater .....1—Babcock & Wilcox, tubular.

Economizer .....1—Babcock & Wilcox, continuous tube. (Guaranteed combined efficiency at 520,000 lb per hr—not less than 86.98%).

Boiler Feed Pumps .....2—Byron-Jackson, barrel type, 1190 gpm against total differential pressure of 1,550 psi.

Turbine Drives .....General Electric, 1550 hp, 36 rpm. Inlet pressure 400 psi at 700 F, exhaust 50 psi.

Deaerating Heater .....1—Liquid Conditioning Corp., horizontal spray type, 550,000 lb per hr, operating pressure 45 psi, storage 137,500 lb for 15 minutes.

Forced Draft Fan .....1—Sturtevant, Turbovane, 685,000 lb hr at 105 F, against 13.3-in. pressure.

Turbine Drive .....1—General Electric, single stage, through reduction gear, 460 hp, 5027-1150 rpm, 400 psi, 700 F inlet steam; and 15 psi exhaust.

Induced Draft Fan .....1—Sturtevant, TVID, 167,000 lb gas per hr at 385 F against 12.8 static pressure.

Turbine Drive .....1—General Electric, single stage through reduction gear, 460 hp, 5027-1150 rpm. Inlet pressure 400 psi at 700 F, exhaust 15 psi.

Combustion Control .....Bailey Meter Co.

Turbo-Generator .....1—General Electric

Turbine .....7500 kw. Inlet pressure 1200 psig and 950 F. Exhaust 80 or 45 lb. Automatic extraction at 410 lb and admission at 400 lb.

Generator .....10,000 kw, 80% pf, 13,800 volts, 3 phase, 60 cycles.

exceeds 10 micromhos it is wasted to the sewer until the condition causing it is corrected and the water is again suitable for use.

Boiler Water

Boiler water concentrations are also very closely controlled. This is accomplished by the continuous blowdown method and boiler concentrations are held within the maximum prescribed limits as follows:

Phosphate	15-30 ppm
Sulphite	5-10 ppm
Conductivity	500 micromhos
Silica	3.0 ppm

The blowdown rate to maintain these or lower concentrations amounts to approximately 5.5%. The water is discharged to a blowdown tank where it is allowed to flash, the flash steam being fed to the 400 lb steam system and the water is discharged into the feedwater line to the low pressure boiler feedwater header.

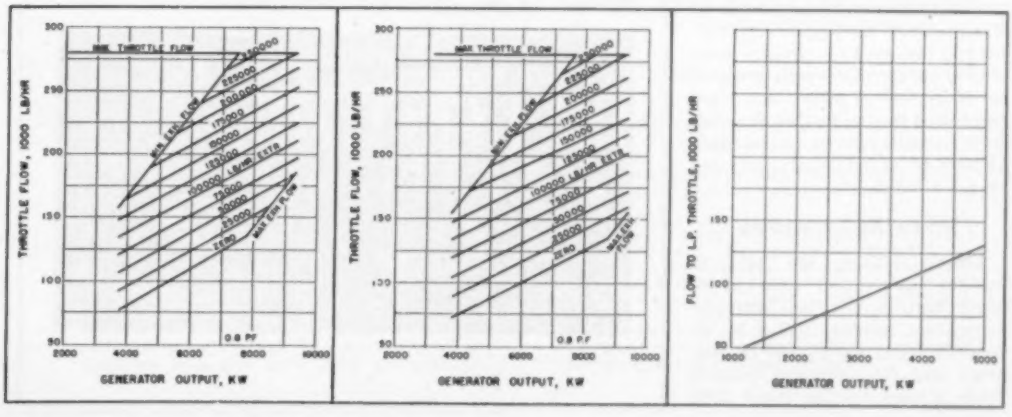
Operation

This unit has now been in operation more than 7,000 hours. It has been operated continuously, except during scheduled mill shutdowns, on loads ranging from 300 to 400 lb/hr and the turbine on loads of 11,000 to 12,000 kw continuously, with only minor adjustments required. The boiler has been inspected on two scheduled mill shutdowns and we have found no evidence of active corrosion. The presence of a small amount of black magnetic iron oxide deposit is known to have entered through newly installed piping from the condensate return systems, and partly from mill scale on the boiler tubes and headers, as this boiler was not acid-cleaned before operation.

Our past experience with tur-

7500 kw turbine with 10,000 kw .8 pf, 13,800 v, 3 phase, 60 cycle generator

Curves at left show the expected performance when operating with initial steam pressure of 1,200 lb G, 950 FTT, extracting at 400 lb G and exhausting at 80 lb G. Curves at center show the performance when operating with the same initial steam pressure and temperature, but exhausting at 45 lb G. Curve at right shows performance when operating on admission steam only at 400 lb G.



bine-driven feedwater pumps and the need for additional 45-lb steam prompted us to again use this type of drive on all the auxiliary equipment for the boiler. Feedwater flow is controlled by varying the speed of the turbine driving the feedpump without the use of a conventional feedwater regulator. This has proved to be a very dependable method of level control and at a considerable savings in power, as it eliminates the pressure drop across a throttling feedwater regulator.

Automatic combustion controls regulate fuel, air, and gas flows. Here again air and gas flows are controlled by raising or lowering the speed of the turbines driving both forced and induced draft fans.

Economics

Prior to this installation, a maximum of 37,000 kw was available for production. This consisted of 32,000 kw from the power plant and 5,000 kw of purchased power. We now have reached a peak of 42,500 kw in the power plant and we no longer use purchased power except during overhauls and inspections of the turbines.

As a result of the decision on the part of the management of Union Bag and Paper Corporation to take advantage of progress made in power engineering, we are realizing a reduction in our overall power costs of 25% when compared with the total power cost for the year 1949, together with an increased production of 150 tons of finished paper per day.

It is not our purpose to create the impression that the use of high pressure steam is the answer to all the problems of the power engineer in his quest for cheaper power and steam. Each mill presents an individual problem, and must be studied thoroughly before a definite recommendation can be made to provide for increased power and steam demands.

Diversified Applications

Steam turbines are built in twelve basic types from which more than ten thousand combinations are available, fitting an almost limitless variety of applications and for pressures ranging from atmospheric to about 2500 lb with temperatures up to 1050 F. Thus with this broad range of operating conditions available in this type of equipment, many industries having use for process steam can affect substantial savings by studying their problems and making use of more modern operating practices either by superposing on existing power plant equipment or through the use of mixed pressure extraction-type turbines.

While this article treats only with the problem which confronted us, it does prove what can be done to reduce power costs when a progressive minded management takes advantages of engineering progress.

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Published by permission of TAPPI. Paper presented at the Fifth Engineering Conference of the Pulp and Paper Industry, Cincinnati, Ohio.

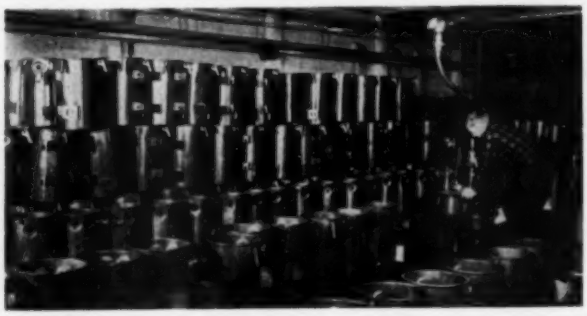
Arkansas Plant of Larkin Leetro Products Now in Full Production

Larkin Lectro Products Corp. manufacturers of spot, arc, projection and butt welders and distribution and power transformers, are now in full production in their 80,000 sq ft modern plant at Pine Bluff, Arkansas.

The company started producing resistance welding equipment and a-c transformer type arc welders in their New York City plant some 12 years ago. Late in 1947, they started the manufacture of distribution and power transformers. When the New York plant proved inadequate for this type of production, they moved to Pine Bluff, Arkansas.

Manufacturing operations now include distribution transformers and power transformers of the oil immersed and non-inflammable liquid immersed types, ranging from 3 kva to 10,000 kva capacity, limited at present to a voltage of 72 kv. The plant also manufactures dry type transformers up to 5 kv high tension. Two production operations are illustrated.

Future plans call for increasing power transformer range to the 110 kv class.



Maintenance of Anti-Friction Bearings——

By E. P. Stahl, The Garlock Packing Company

Many removed ball and roller bearings can be reused . . . this Part 3 covers recommended removal techniques . . . cleaning procedures . . . when to discard . . . general maintenance rules.

A THOROUGH removal of gummed lubricating oil or grease and a subsequent lubrication will usually cure ills in ball and roller bearings. Before beginning the job, the maintenance or shop man should take a few moments to study the assembly and determine the best way of getting the bearings out of the machine without damage. A study of the assembly drawing of the piece of equipment to be dismantled is often helpful. The next step is to use efficient removal tools. The most efficient tool for doing this work is usually an arbor press, although in field work and small shops one of the several varieties of commercially available bearing pullers will serve.

In cases where an arbor press is not available an improvised removal tool consisting of a vise and a drift or piece of tubing can be used. If the shaft is held in the vise, protect its surface with copper sheet or hardwood blocks.

Remember that the bearing ring or race that turns (generally the inner race) is usually put on with a tight fit. A general rule in fitting bearings is that the bearing race that turns is usually a tight fit on the shaft or in the bearing housing. However, if the bearings are made with separable parts as is the case with some cylindrical roller bearings, both races may be tight. The rule is: Press or pull only wherever possible on the race that is tight. Press or pull straight and square to keep the bearing race from cocking, which might score the shaft or housing and could damage the bearing. Be sure never to press against bearing shields or separators. Recommended removal techniques are illustrated.

Cleaning

Before cleaning ball and roller bearings it is advisable for the user to check the method recommended by the bearing manufacturer. Several cleaning methods are excellent—if properly carried out. However, they can be disastrous in the hands of a careless person.

When to Discard

1. Broken or cracked rings, caused by improper fit or excessive force used in removal
2. Dented shields or seals in ball bearings, frequently caused by a drift that slipped during removal of bearing
3. Cracked or broken separators, often a result of dirt or metal chips lodged between the moving parts
4. Broken or cracked balls or rollers
5. Flaked or spalled areas on balls, rollers or raceways
6. Brownish blue or blue-black markings on bearing parts, which indicate overheating
7. Brinelled or indented raceways caused by impressing balls or rollers into the races

General Maintenance Rules

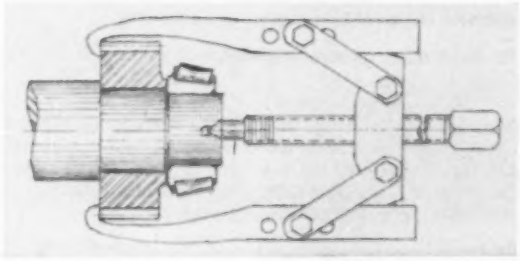
1. The detailed repair and maintenance procedure listed in the bearing manufacturer's instruction book and catalog should be studied prior to undertaking any repair job. Particular attention should be paid to installation tolerances, wear limits, adjustments and lubrication.
2. The highest degree of cleanliness should be observed when handling bearings.
3. Before starting a repair job, make sure all installation tools and spare parts are available. Plan ahead for repair periods so that the job may be completed speedily and successfully.
4. Keep detailed records of repairs including measurements of worn parts and number of hours they were used, and new parts installed. An analysis of these records will indicate the hours of operation that may be expected from the bearings for a given application and thus permit prediction as to when they should be renewed. Measurements of new bearings will indicate whether or not they come within the tolerances recommended by the manufacturer.

Any number of things can happen depending upon the nature of the cleaning agent and the length of time the bearings have been exposed to it. Some solvents etch bearing surfaces. Others contain just enough water to leave moisture behind in hidden points of the bearings causing rust. Still others contain elements that combine with the lubricants to form harmful compounds.

The following is an accepted method employed successfully by many bearing users. Place the bearings in a basket and suspend the basket in a suitable container of clean, cold petroleum solvent or kerosene, and allow to soak, preferably over night. Be careful when using gasoline containing ethyl or other anti-knock compounds, which are poisonous when absorbed in cuts or inhaled. All of these solvents are highly inflammable and precautions should be taken to prevent fires.

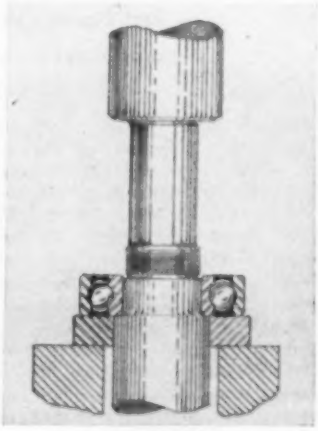
In cases of badly oxidized grease, it may be found expedient to soak bearings in hot, light

Three Ways to Pull Bearings



1. Bearing Puller

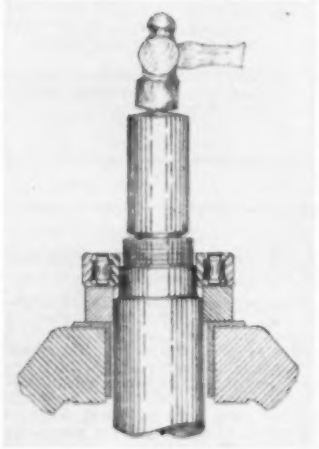
Puller used to remove a tapered roller bearing (cone and roller assembly) from a shaft. Bearing puller must be set up so that it will push or pull straight or square. Adjust puller so that it will not slip over the inner bearing race or cone when pressure is applied. Mishandling or bearing pullers can damage shaft threads, keyways or shoulders.



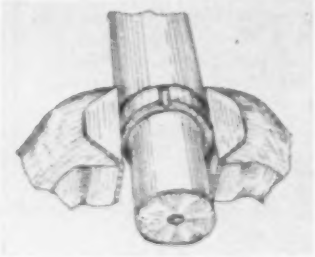
2. Arbor Press

Setup employing press ram, press table and two blocks. Ram is pushing down against the shaft on which inner ring or race of a ball bearing is tightly fitted. Stripping is being done by the support blocks under the rings. Keep press table and blocks clean and square.

3. Improvised vise-drift-hammer-setup



Improvised setup for small machine shop or garage. Vise is used instead of an arbor press and a brass slug or tube in place of a press ram. If shaft is held in a vise, protect surface with a copper sheet or wood-blocks. A closure cap or housing cover can often be employed to remove a ball bearing from a shaft. As illustrated at the left, the closure cap is loosened from the housing, pushed back and a split ring or bushing employed between the inner ring of the bearing and the housing in order to provide contact against the inner ring. A bearing puller (Item 1) is used to complete the operation.



Sometimes a separable inner race or ring is installed against a shaft shoulder of equal diameter so that there is no way to get hold of it and remove it from the shaft (see below). Leave the ring on the shaft if it is usable. If not, cut it off with a torch. Burn it part way through but do not harm shaft. If it won't loosen enough to pull off, crack it with a chisel.

grease (200-240 F). Agitating the basket of bearings slowly through the oil from time to time, or in extreme cases, boiling in emulsifying cleaners diluted with water, will usually soften the contaminating sludge. If the hot emulsion solutions are used, the bearings should be drained and spun individually until the water has completely evaporated.

The bearings should be immediately washed in a second container of clean petroleum solvent or kerosene. Each bearing should be individually cleaned by revolving by hand with the bearing partly submerged in solvent, turning slowly at first and working with a brush if necessary to dislodge chips or solid particles before finally spinning the bearing freely. The bearings may be judged for their condition by rotating by hand. After the bearings are judged as being clean, they should immediately be spun in light oil to completely remove the solvent, coated by hand with petroleum, and wrapped at once in clean, oil-proof paper while awaiting re-assembly.

The use of chlorinated solvents of any kind is not recommended in bearing cleaning operations because of rust hazards involved, nor is the use of compressed air desirable.

Bearing Installation

Bearing installation and re-installation is just the reverse of bearing removal. Make sure the shaft and parts associated with the bearing are in good condition. If shaft shows wear due to inner bearing race having rotated on it, metallize or weld it at the bearing seat and turn and grind to size. If shaft shows results of corrosion at the bearing seat or point of the seal, it can be chromium plated. Chromium plating of shafts to resist wear and corrosion has been gaining momentum in steel mills and paper industries where the bearings are subjected to water and other corrosive conditions. Use an arbor press for installing bearings.

If the distance between the end of the shaft and the bearing seat is fairly short, hold the shaft in a vise and press the bearing onto the shaft with a clean tube. This can be done either with the arbor press or by tapping with a hammer evenly around the tube. If the end of the shaft is flush with the bearing, use a drift or bearing installer. These are made with flat ends to use with shafts that are flush with the bearing and with counterbores to use where the shaft projects beyond the end of the bearing for a short distance. Tap lightly at first to make sure the bearing or bearing ring or race goes on square and does not scrape or burr the bearing seal. Be sure the bearing is tapped to a firm seat against the shaft shoulder.

On large bearings, the inner rings usually are shrunk on their shafts. This is a simple operation which consists of heating the bearing or inner ring in clean oil or a temperature controlled oven to a temperature between 200-240 F. This expands the inner ring sufficiently so that it should slip over the shaft to the bearing seat. Do not overheat the bearing or it will lose its hardness. If expanding the ring is not enough, cool the shaft in dry ice to make it shrink.

Ways and means of employing hydraulic pressure to aid in mounting and dismounting large ball and roller bearing have been developed by one of the large ball and roller bearing manufacturers. Application of this technique indicates its routine practice will be of major assistance to all companies using equipment incorporating large anti-friction bearings. This technique is particularly useful in steel mill and paper machinery where the removal of large bearings from shafts is of prime importance.

Using the oil pressure method of dismantling bearings from shafts makes the operation a matter of minutes and protects the parts from unintentional abuse.

Collaboration of the following organizations in preparation of this article is acknowledged with appreciation: *Anti-Friction Bearing Manufacturers Association*, New York City; *Fafnir Bearing Company*, New Britain, Conn.; *Keystone Lubricating Company*, Philadelphia, Pa.; *New Departure—Division General Motors*, Bristol, Conn.; *New York & New Jersey Lubricant Company*, New York City; *Norma-Hoffman Bearings Corporation*, Stamford, Conn.; *S. K. F. Industries, Inc.*, Philadelphia, Pa.

New Fiberglas Plant—Anderson, S. C.

Efficient, continuous, one-floor operations for production of Fiberglas yarns will be facilitated in **Owens-Corning Fiberglas Corporation's** new plant in **Anderson, S. C.** this artist's sketch shows the layout of the plant, which will cover 175,000 sq ft and be located on a 130-acre plot on the Iva Highway, 4 miles south of Anderson.

It is planned to have the plant in operation about mid-1951 to meet currently large military requirements, as well as civilian demands. Fiberglas yarns are used widely as a base for electrical insulation; to reinforce plastics, paper, tape and certain industrial rubber products; for cloths coated with rubber, vinyl and neoprene, and for decorative fabrics.

General contractors are the Daniel Construction Company, Greenville, S. C. Plans were prepared by Lockwood Greene Engineers, Inc., New York and Spartanburg, S. C.

Acoustical Treatment in the Craddock-Terry Shoe Corporation, Lynchburg, Va.

Office is 200 ft x 50 ft with a 10 ft ceiling. Noise source consists of many types of office machines. There is also noise from the vibration of production machinery on the floor above which is transmitted through the concrete ceiling.

Reduction of noise was accomplished by cementing perforated tile (Acousti-Celotex C-9), a product of The Celotex Corporation, directly to the ceiling. Entire job was done after working hours without interference with normal operations.

A 40 per cent reduction in noise has been realized. As the relief to the workers is always in greater proportion than the percentage decrease in noise, installation definitely increases the overall efficiency and morale.

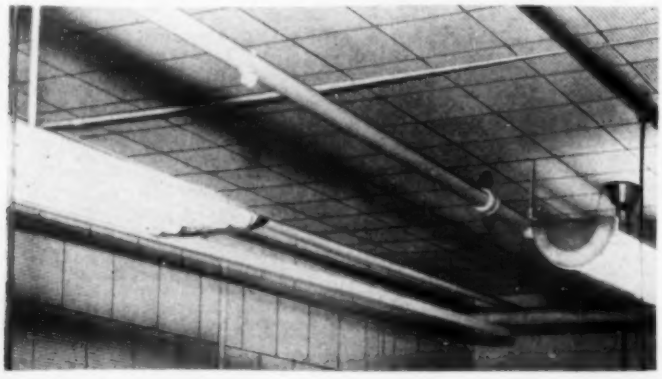
——How Acoustical Treatment

By Francis A. Westbrook

ABATEMENT of noise in industrial plants can be accomplished by acoustical treatment or by the isolation of machinery vibrations. Under some conditions it is more effective to employ both methods in the same area.

There is no cut and dried system of installing acoustical tile. Every case must be handled with respect to local conditions. The noise is not eliminated at its source but its reflection and building up effects are greatly reduced. The confusion of noises coming from different parts of the room, which is so wearing on the worker's nerves, is also reduced to a point where it ceases to be a serious handicap. Net result is that the room is much more comfortable to work in.

Conditions often exist where the vibration of machinery is the cause of some, or most, of the noise. The way in which machines are mounted is often the cause of a great deal of noise. When a high speed machine is firmly bolted to the floor



ONE OF THE LARGE TAG MACHINE ROOMS OF THE CRADDOCK-TERRY SHOE CORPORATION IN LYNCHBURG, VA., WAS ALSO ACOUSTICAL TREATED. ACOUSTI-CELOTEX C-6, 12-IN. X 12-IN. X 1¼-IN. THICK WAS USED ON WALLS AND CEILINGS BECAUSE OF THE VERY HIGH NOISE LEVEL.

Acoustical Treatment in Printing Department of Large Paper Mill

In this department, wrappers for fruits and vegetables are printed on paper made in the mill. The presses are of the rotary, high speed type, which are noisy.

Acousti-Celotex tongued and grooved tile, 24-in. x 24-in. x 1-in. thick, a product of The Acousti-Celotex Corporation, were applied in the ceiling panels and available wall space to within 8 ft of the floor.

This resulted in a reduction of the noise level of some 70 per cent, and there was also felt a benefit in the adjoining office space. Local conditions did not necessitate tile on the walls all the way down to the floor.

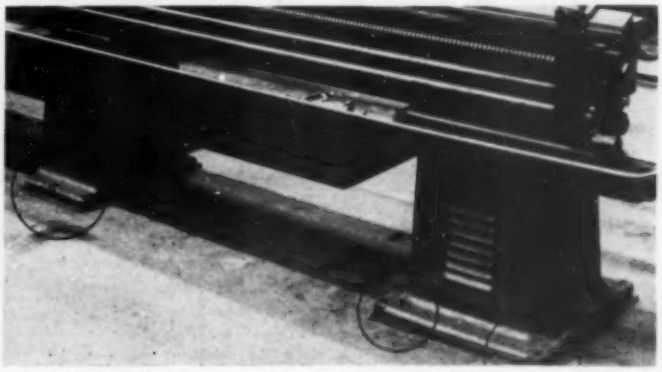
Can Cut Factory Noise

the latter, whether of wood or concrete, often acts as a sounding board which transmits the vibrations and the resulting noise to many parts of the building. A great aid in reducing noise from this source is the use of resilient mountings to break the continuity of the vibrations between the machine and the floor.

Thanks to the development of the new adhesives it is now possible to cement such mountings to the floor and to the base of the machine. In addition to reducing the transmitted vibrations the cemented resilient pads often make it unnecessary to bolt the machine to the floor at all, which saves time and labor and also avoids damage to the floor itself.

Where bolting must be resorted to, resilient bushings are available through which the bolts may be passed, and washers of the same material under the nuts may be used, thus providing for isolation of the vibrations from the floor and building structure.

Under some circumstances where a number of machines are placed close together, which are in continuous operation and have identical noise characteristics, it is not



THIS LEBLOND LATHE, AS IS ALL MACHINERY IN THE MACHINE SHOP OF EXCELSIOR MILLS, CLEMSON, SOUTH CAROLINA, IS MOUNTED ON UNISORB RESILIENT PADS. NOTE IN THE FELTERS CO. PHOTOGRAPH THAT THE LATHE IS NOT BOLTED TO THE FLOOR. PADS ARE FASTENED TO FLOOR BY INDUSTRIAL CEMENT.

possible to do much to reduce the noise, or to provide relief for workers. However, if only part of the room is occupied by the noisy machines and sound absorbing material is installed over the whole room, the workers away from the machines will be benefited by the treatment. This is because the acoustical tile on the ceiling greatly reduces the spread of noise by reflection into the area where there are no machines. Under some circumstances it is advantageous to have acoustical tile on the side walls, as was done at the Craddock-Terry shoe plant (see illustrations).

The machine operators will then experience an immediate relief by moving a short distance into the free space, as is usually practicable for them to do for short periods without loss of production. In fact it has been found by experience that such brief periods of relief are well worth while as they result in definitely increased efficiency.

The abatement of factory noise may be accomplished by several means, depending on how the machines are located, how they are mounted and on the type of building or room in which they are installed. These varying conditions and corresponding methods of sound conditioning are well exemplified by the experiences of a large concern which manufactures envelopes in the South.

Industrial Plant

Case History

The chief engineer of this concern first made tests in a factory type building in a room fully occupied with large fast running and noisy machines about 20 ft long, 4 ft wide and 4 ft high. The room is 45 ft x 130 ft and the ceiling only 12 ft in height. There is only a minimum of free space around these machines.

A double sound insulated partition was first installed approximately across the middle of the room. One half was acoustically treated and the other left unchanged so as to provide a basis of comparison. Acoustical treatment consisted of covering the ceiling with ¾-in. thick tile. Practically no perceptible diminution of noise resulted.

The next step was to make baffles with acoustical tile on each side and hang them from the cross beams of each bay down to within 7 ft of the floor and about 8 ft apart. A very definite reduction in noise resulted. To offset this advantage the baffles interfered so greatly with the circulation of air that it was impossible to ventilate the space adequately in hot weather. By the same token it would be impossible to heat it properly on cold days.

In other words, with the low ceiling and closely placed machines with identical noise characteristics, the direct machine noise is so great that any practicable acoustical treatment is of little value.

Tests made in a modern sawtooth single floor building gave very different results. Here the sawtooth runs from 14 ft above the floor at the low point to 24 ft at the peak. The bays are 24 ft wide and permit considerable space around the machines. By placing acoustical tile on the under side of this much higher ceiling rebound of the noise against the sawtooth windows is greatly reduced, and there is a very definite reduction of over-all noise throughout the area.

But even here a person near enough to one of the machines to be subjected to its direct noise gets little or no benefit from the acoustical treatment. If he stands in an aisle 8 to 10 ft away from the machine, he experiences a decided reduction in noise, which shows the advantage of not having the machines too close together.

In another plant of this company the noisy machines are installed at one end of a room 200 ft x 113 ft and occupy only about one-third of the space. This has been treated acoustically in a similar manner to the space just described and there is a substantial reduction of noise in the other two-thirds of the area. This of course makes it possible for the operators to step into the comparatively quiet area for short relief periods from the excessive noise in their work space. The results have been decidedly beneficial.

Other tests have been made by placing resilient pads under the machines. It is the opinion of the chief engineer that where the ceilings are low and the machines close together this method gives the only worth while noise reduction, because the vibration transmitted to the floor is greatly reduced and the floor does not act as a sounding board. In fact the reduction of noise by this means has been found quite remarkable in a single floor building with a 5-in. thick concrete floor poured directly on the ground.

In one of the plants under consideration ½-in. thick felt pads (Unisorb) were used under the machines and on another 11/32-in. thick pads made of rubber and fabric (Fabreeka). In both cases the pads were cemented to the floor and to the machines without other fastening. Identical machines, placed side by side, one equipped with the resilient pads and the other without, were run alternately so as to note the noise reduction due to vibration isolation. The effect of the pads was so beneficial that the company has decided to use them in all new work. The management also feels that they have an additional important advantage in eliminating the necessity of drilling the floors.

Other Applications

The rubber and fabric type pads have been installed in numerous other plants in the South and Southwest. They have been placed under a wood chipper in a Florida plant with unusual success. This machine has two blades instead of four and vibrated so badly that the steel anchor bolts holding the base to the concrete started to snap off and the base cracked.

After repairs, pads were installed between the machine and the concrete. Material used was 1-in. thick Fabreeka in two pads 18-in. x 18-in. in size. Installation has proved highly successful.

Industrial noise abatement is a highly specialized field. Measures taken must be varied under different circumstances. It is even possible for improperly engineered resilient pads to make the transmitted vibration and noise worse than if none were used. Consequently, it is highly desirable to consult with reliable manufacturers.

Maryland Tannery Air Conditions for Hide Storage

Area held at 31-33 F with relative humidity of 85-90 per cent.

THE WATER COOLING TOWER AT THE BYRON TANNERY IS MOUNTED ABOVE THE NEW FAN AND COIL ROOM. REFRIGERATING MACHINE SPACE ADJOINS THE TWO SHELL-AND-TUBE CONDENSERS.

A WELL KNOWN tannery at Williamsport, Md., has been operated by W. D. Byron and Sons since 1897. The storage room in which hides are kept is now air conditioned, using a special system furnished by Frick Company.

The hide storage measures 96 ft by 46 ft, in round numbers, and has a low ceiling, 8½ ft high. The building is an old one with 24-in. stone walls, covered on the inside with a thick layer of plaster. The loft above the ceiling contains the air ducts, which are insulated with corkboard. At one end of the building is a large handling room connected with the loading platform. Here the hides are sorted, weighed and piled on pallets. At the opposite end of the building is a brick addition which houses the refrigerating equipment. On the roof of this is a Marley cooling tower.

The hides when received at the plant have been cured for 30 days and swept free of salt. The storage is held between 31 and 33 degrees, with a relative humidity of 80, while being loaded, and 85 to 90 per cent for holding purposes.

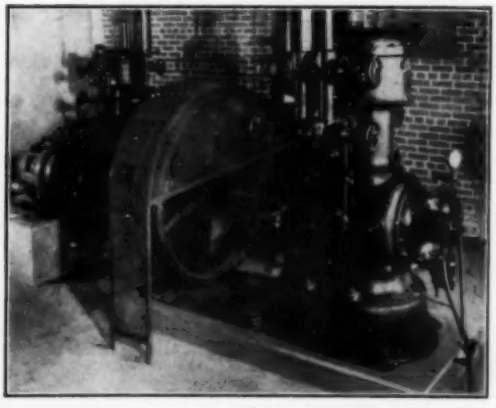
The path of the air resembles a figure 8, placed horizontally. About one-third of the refrigerating machinery space is devoted to a high room in which the fan and cooling coils are placed. The coils are slightly over 14 feet long, and consist of prime-surface pipe, over which brine is sprayed to remove frost. The brine spray nozzles are turned upward; the brine strikes an inverted trough which directs it downward over the coils without splashing. A large brine tank, 19 ft long by 8 ft wide by 1½ ft deep, is placed below the coils. Circulation is maintained by a Weinman bronze-fitted pump of 175 gallons capacity.

An American Blower fan of type HS is located above the coils, and is driven at either of two speeds by a 20-hp motor. The fan pushes the air downward through the coils and eliminators, into the ducts above the ceiling of the storage. Eight louvered openings distribute the air over the hides. Approximately 54,100 feet of air are circulated per minute. Galvanized steel sheets direct the air through the coils and eliminators.

Compressors

Refrigeration is provided by two enclosed ammonia compressors of size 6 by 6 and 7 by 7. Both machines are equipped with Flexo-Seals, automatic unloading devices, and force-feed lubrication. They are driven through V-belts by Ideal motors of 30 and 50 hp respectively. Other high-side equipment includes two 24-in. by 14-ft vertical shell-and-tube condensers, a 20-in. by 5-ft oil trap, a 20-in. by 16-ft receiver and a purger.

Harold G. Burrill and Associates, engineers and contractors of Baltimore, engaged Frick Company to install this equipment and left the detailed engineering entirely in their hands. The contractors prepared the site, and furnished labor and skilled mechanics for our engineer to supervise; they also designed the pallets. The completed storage takes care of about 600 tons of hides, keeps them in first class condition, and effectively prevents loss by shrinkage.



FRICK COMPRESSORS WITH AUTOMATIC UNLOADERS.

Rx LUBRICATION

Part XVIII
Storage and Handling of Lubricants

By C. J. Copley and Will Risk

LUBRICANTS, B. C.—Lubricants, BEFORE the CUSTOMER receives them, are carefully handled by reputable refiners. Utmost care is exercised in their production, packaging and delivery. Contamination, before and during shipment, is scrupulously avoided. Clean and clearly marked containers are used. Every precaution is exerted to assure delivery of unadulterated oils and greases. Without such care, the benefits possible in the selection and use of the right industrial lubricant will never be realized.

LUBRICANTS, A. D.—Lubricants, AFTER DELIVERY, are the user's responsibility. It is up to the purchaser to protect the quality and lubricating value of each of the oils and greases he buys and has delivered. Depending on how his lubricants are handled and cared for in his plant, lubrication results can be good or bad.

For the purposes of this discussion, however, the storage and handling of lubricants after delivery to the industrial plant is the major consideration. It must be assumed that lubricants are purchased in clean, well-labeled, and properly sealed packages.

—— THE BASIC REASON FOR PROPER STORAGE AND HANDLING ——

In previous parts of this LUBRICATION NOTEBOOK, it has been stressed that "correct lubrication is the use of the proper lubricant in the proper way at the proper time." If lubrication is designed to accomplish that three-fold objective, machinery will be long-lived. There will be freedom from interruptions in production due to so-called "lubrication failure".

On the other hand, there is much more to this definition than meets the eye. The words "proper lubricant" mean more than proper manufacture and selection of the lubricant for each type of machine or surface to be lubricated. PROPER LUBRICANT must mean that all of the advantages inherent in the manufacture and selection of the lubricant are protected and utilized in each lubrication process being simultaneously and individually carried on between the thousands of moving parts found in the industrial plant.

As so often happens, there has never been a system devised which assures the use of the correct lubricant. There is a considerable human element involved.

Good housekeeping practice, particularly with regard to the storage and handling of lubricants, does more to assure the use of the proper lubricant than any one single thing. Furthermore, there are other tangible benefits in the way of labor-savings, purchasing costs, and materials handling costs to accrue.

WHAT GOOD STORAGE AND HANDLING PRACTICE MUST ACCOMPLISH

Avoid Contamination with Dirt—Dirt and dust in the lubricating film will promote wear of the machine. In large oil circulation systems, where oil is used over and over again, such contamination even promotes oxidation and a gradual thickening of the oil. Dirt in the oil or grease used to lubricate antifriction bearings particularly shortens bearing life. Any way you look at it, dirt and dust in the lubricant will sooner or later shorten the lubricant's useful life or increase maintenance.

Avoid Contamination with Other Lubricants—A so-called water repellant type of grease is stored beside a soda-base grease which is one that readily mixes with water. The same grease paddle is used to take grease out of both pails. A mixture of grease takes place on the paddle. This mixture may contain considerable soda-base grease at some particular time. Finding its way into a bearing where a minute quantity of water-repellant grease is needed to resist water washing, the soda-base grease, because of its nature, is washed away. What happens? Wear, of course.

Such a thing as this may not seem important. But there are many variations of these seemingly trivial happenings committed under the name of storage and handling practice. Multiplied and magnified by the number of bearings and periods of lubrication over a span of months, one can see that there are many opportunities for correct and proper lubrication to suffer.

As containers are too often used for more than one oil, admixture with each other is easily accomplished. The records of many companies show endless complaints which, when finally traced, arose from such a source.

Freezing Temperatures to Be Avoided—Aside from difficulties in handling the product, which consumes time, waste and labor, freezing temperatures are detrimental to product only when there is something in the oil or grease which congeals and separates. This can happen, too, when the soluble oil or grease contains a percentage of water necessary for its manufacture and use.

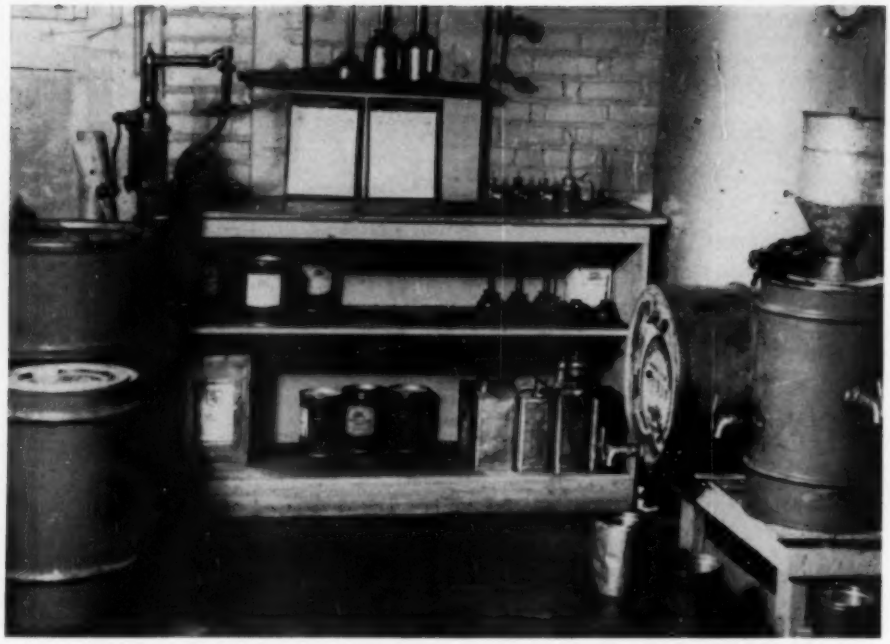
Avoid Careless Handling—Not only will careless handling of packages of lubricant result in leakage and loss of product, but it can also create safety or fire hazards. Rough handling and/or exposure to the elements can obliterate product identification and result in a confusion of brands used for specific applications. Correct and economical lubrication practices are thereby defeated—even before the lubricant reaches the machine.

Avoid Contamination with Water—Contamination with water will make some lubricants useless. This is true of many oils used for steam cylinder lubrication. Many special greases are in this category. Certainly water, under few circumstances, can be considered the lubricant's benefactor. To remove it, if possible or feasible, costs money and is extremely inconvenient.

NINE STEPS TO GOOD STORAGE AND HANDLING

Although the foregoing stresses the basic things to avoid in the actual protection of the lubricant, the planning and development of procedures for the correct handling of lubricants is complicated

THIS "OIL STORAGE" IS IN A MEDIUM SIZE WOODWORKING PLANT WHERE ALL MACHINE OPERATORS DID THE OILING AND HAD FULL ACCESS TO THE OIL SUPPLY. IT CREATED A FIRE HAZARD, CONFUSION OF BRANDS AND OIL CONTAMINATION WHICH BROUGHT ON A HOST OF LUBRICATION COMPLAINTS AND REAL TROUBLES.



IN COMPARISON WITH THE CONDITIONS ILLUSTRATED ON THE PREVIOUS PAGE, THIS OIL STORAGE AREA OF ANOTHER WOODWORKING PLANT OF COMPARABLE SIZE, EMBODIES MOST OF THE GOOD FEATURES OF ANY WELL-DESIGNED OIL HOUSE. IT WAS ARRANGED WITH LITTLE EXPENDITURE OF TIME AND MONEY AND FEATURES CLEANLINESS AND ORDERLINESS. LUBRICATION DETAILS IN THE REST OF THE PLANT ARE CORRESPONDINGLY WELL HANDLED.

by several things not mentioned and which are not directly related to the lubricants. A practical approach to good storage and handling cannot be made on the basis of do-and-don'ts. Rather, the development or improvement of such practices in any industrial plant should be investigated and carried out on the basis of the following nine steps.

1. Determine how you want your lubricants delivered. Based on whether you obtain shipments in barrels, by rail or truck, by tank car, in bulk, or in small packages will depend most of the additional steps to be taken in the direction of good storage and handling. Obviously, the decision as to how you want lubricants delivered must be made on the basis of the lubrication demand of the plant. The calculated quantity and methods of delivery over a period of time will indicate what direction common sense storage and handling should take.

2. Determine the best way to handle the lubricants received at the unloading point. Depending on whether deliveries are taken by rail or truck, unloading platforms should be the proper height for easiest and safest handling of heavy drums. If the volume of materials received (lubricants and other plant materials) does not warrant unloading platforms, wooden or metal ramps should be constructed so that the heavy drums can be eased to the ground or storage level in an end-wise fashion. To avoid leakage and the opening of seams in steel drums, they should never be dropped from a truck or railway car—not even onto a bed of old auto tires.

To get the drums (and most oil and grease is purchased in drums) to the point of storage, distance and labor outline the problem. Procedure may vary from rolling the drums on the floor, to the use of light-weight iron rails on which to roll or slide the barrels, to the use of two-wheeled hand trucks, or powered trucks.

3. Determine if it is to be outdoor or indoor storage. Where it is at all possible avoid outdoor storage. It breeds a host of difficulties including obliteration of labels, leakage of product, contamination, etc. If packages are stored out-of-doors the following precautions should be taken: lay drums on their sides; if space does not permit this, store them up-right after props are put underneath one side so that rain-water will run off and not collect around their bungs; keep all bungs tight; and dry and wipe clean all barrel heads before removing bungs.

4. If it is to be indoor storage, consider the general nature of the storage problem before any specific measures are taken. As far as the design and installation of facilities indoors are concerned, they do not need to be expensive or too elaborate. Simply "cut the cloth to suit the purpose". Just provide ample space to store and keep accessible enough lubricant, containers, and dispensing equipment to keep the plant correctly lubricated.

Regardless of the type or size of the lubricants' storage space, it should be designed for the plant machines and the convenience of the men who use

it. In a small plant, a separate room or corner of a department or stockroom may be set aside for this purpose. In larger plant it may be advantageous to build an "oil house" especially designed for oil storage purposes alone.

At all times, a convenient, clean and safe storage space for lubricants is important to a correctly lubricated plant. From lubrication's point-of-view, this cannot be emphasized too often. It makes it easy for the lubrication personnel to do a better job.

5. Design the lubricant storage space or "oil house" to feature cleanliness. Avoid dusty, dirty locations associated with the manufacturing processes being carried out in the plant. Chemical fumes, sawdust, fly in the textile mill, coal and cement dust are typical sources of contamination.

Because every step is taken in the refinery to assure the delivery of clean lubricants, careless handling must not be allowed to destroy their condition. The cleaner the "oil house", the cleaner the oil and grease going into the bearings on the machine will be. Oilers that work in clean surroundings take more pride in their work. Certainly a cupboard full of oil and grease hidden under a back stairway does not promote the idea of importance-of-work—an idea which lubrication personnel must believe in.

Cleanliness in the "oil house" also pays for itself by reducing fire hazards and accidents which oil-soaked floors and messy conditions promote.

White paint on walls and dispensing equipment is recommended. Cement floors should be treated to minimize dust. The use of sawdust or clay to dry the floor is not recommended because they may lead to contamination of the lubricant. A liquid cleaner that dries is most desirable.

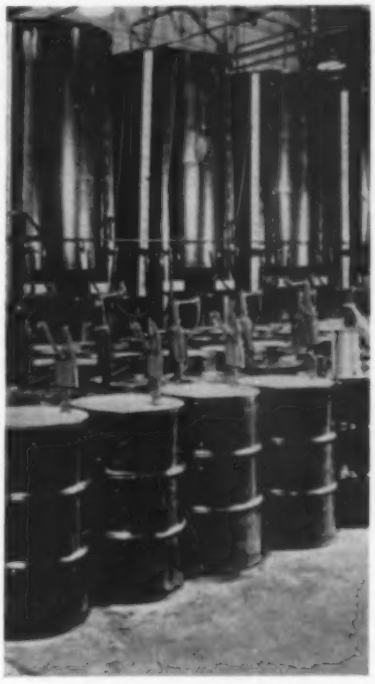
6. Design a storage space of adequate size. Depending on the average consumption of lubricants, their method of purchase, reclaiming equipment needed and the area required for the storage of trucks, carts, and oil and grease handling equipment, the size of the "oil house" may be judged. In estimating the potential space needed, consider that a full-sized drum measures 22½ in. in diameter and 36 in. high. Half-size drums measure 18½ in. in diameter and are 30 in. high. Values on other equipment must be determined directly.

7. Locate the oil storage space with an eye on its convenience. Locate it as nearly as possible to the point of arrival at the plant as well as the points of end use in the various plant machines. By centrally locating the "oil house", the oiler's travelling time will be reduced to a minimum. And it is oiling labor which usually far over-shadows the cost of the lubricants themselves.

8. Make the "oil house" safe. Depending on whether solvents or inflammable liquids are stored in the storage space, every precaution should be observed in accordance with the "fire laws" of governmental units and/or the insurer's regulations. Safety, as regards bodily injury, should be considered and arrangements made to provide practical and convenient hoists, trucks and well-designed barrel racks. If oil or grease is spilled on the floor, the tools for wiping it up should be constantly available.

9. Make someone responsible for managing the oil house. It should be his responsibility to see that records on consumption of lubricants are maintained and that inventory reports, lubrication instructions, oiler's reports or requisitions are processed. It should be his responsibility to see that supplies other than lubricants—oil cans, grease guns, devices, rags, waste, etc.—are stored and made available.

In managing the "oil house", he should also see that equipment is kept clean. Fouled dispensing equipment will not function correctly. By making sure that every product or piece of equipment is well identified and kept in a space reserved for it, orderliness and cleanliness are further impressed on all lubricating personnel.



HERE IS THE "OIL HOUSE" OF A LARGE METALWORKING PLANT. TANKS IN BACKGROUND ARE FOR BULK STORAGE. BARRELS EQUIPPED WITH CONVENTIONAL BARREL PUMPS ARE STANDARD EQUIPMENT AND ARE STORED IN EASILY ACCESSIBLE ROWS.

In the final analysis any plan to build or improve existing lubricants storage and handling methods must be practical. These nine steps provide the pattern. The over-all objective is to secure better control of lubrication costs, maintenance costs and productive machine time through the use of the proper lubricants—lubricants with lubricating qualities that are preserved and protected from refinery to the industrial machine itself.

Measurement and Control of

By E. A. Murphy, Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

Principles of operation, advantages and disadvantages of various types of electrical temperature sensing elements were discussed in Parts 2 and 3 of this series. These included thermocouples, resistance thermometer bulbs, radiation sensing units and optical pyrometers.

PURPOSE of the millivoltmeter pyrometer is to measure accurately the extremely small voltages (Millivoltages) transmitted by the temperature sensing elements. Ordinarily, the millivoltmeter is calibrated directly in temperature units because of the fixed relationships between these small voltages and the temperatures which cause them.

The principle of operation is the same one responsible for the operation of electric motors and many other types of electrical devices. When a coil of wire is suspended between the fields of a magnet, an electric current passing through the coil, if unrestrained, will rotate until its magnetic field is parallel with the field of the magnet. This combination of a magnet and a current-carrying coil is known as a galvanometer.

Let us first consider the construction of an ammeter used for measuring flow of electric current. In order to utilize the above principle in obtaining an accurate measurement of current, two refinements must be added to the crude method described. First, the field set up by the magnet must remain constant, i.e. a permanent magnet must be employed. This is necessary because a change in the strength of the field of the magnet would cause rotation of the coil even though the current flowing through the coil remained constant. Secondly, rotation of the coil must be opposed by a known force such as calibrated springs or suspension wires. This calibrated opposing force is essential in order that the coil may rotate a given distance for a given current flow through it.

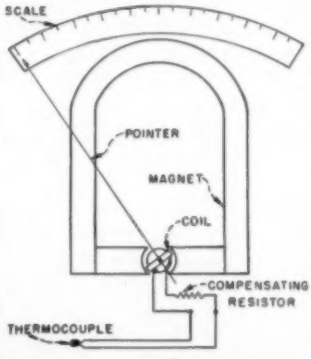
With both of these conditions fulfilled, it is then possible to fasten a very light pointer or needle to the moving coil, and to provide a scale on which the pointer will indicate the value of the current flowing through the coil. Calibration of the device is performed by sending currents of known values through the coil, observing the pointer deflection, and marking the scale to correspond with these values.

The principles described above are applied in laboratory devices such as the Thomason Mirror-Reflecting Galvanometer and the D'Arsonval Galvanometer, as well as in commercially used ameters and voltmeters.

In the previous discussion of galvanometer theory, no reference was made to voltage measurement

Typical Millivoltmeter Pyrometer

Galvanometer coil used in the industrial type millivoltmeter revolves around a soft iron core. This core, plus soft steel or iron pole pieces on the magnet, reduce the air gap between the poles of the magnet and make for a strong, uniform magnetic field.



Several different methods of mounting the galvanometer coil are employed. It may be mounted under tension by means of two suspensions, which are fine wires or filaments running from the top and bottom of the coil to fixed supports. Other methods are' to mount coil between two pivots; to mount it by means of an upper suspension and a lower pivot; or to employ a single pivot in which the pivot is at the center of the coil, and the movement is balanced so that the center of gravity of the whole moving system is at the point of the pivot.

When latter system is used, instrument must be mounted exactly level. With the two-pivot mounting, extreme care in mounting is not required. Regardless of the method, friction must be held to a minimum because of the small current passing through the coil and, consequently, the small amount of torque available to move the coil.

Process Variables - Part 4

Millivoltmeters

Having selected the most desirable sensing element, we must then choose the type of indicating or recording instrument best qualified to do the job. One of the first electrical temperature measuring instruments for industrial use was the millivoltmeter pyrometer.

but rather that the device was described as a means of measuring current, i.e. rate of flow of electrical energy. In order to adapt the galvanometer to a millivoltmeter, it must be altered so that it will measure voltage, or electrical pressure, rather than current or rate of flow. This is accomplished by inserting a very high resistance in the galvanometer curcuit, thereby reducing the current flow to the amount required to cause coil rotation.

To measure voltage, or electrical pressure, some current must be used and the true voltage will differ from the indicated voltage by an amount equal to voltage loss in the external circuit. Since, by Ohm's law, this voltage drop will be equal to the product of the current flow times the resistance of the circuit, it follows that the smaller the current flow the more accurate the indicated voltage. The best voltmeters therefore have very high resistances and the current flowing through them is extremely small.

Although movement of the galvanometer coil in a millivoltmeter is still caused by the small current flow through it, calibration is accomplished by applying a series of known voltages to its terminals, and graduating the scale in terms of the voltages which cause the current flow responsible for coil movement.

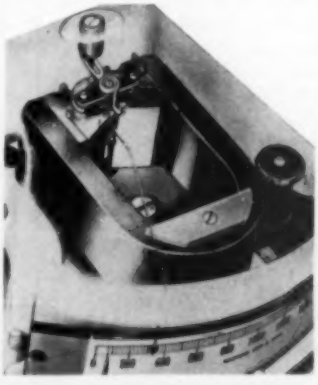
A typical millivoltmeter pyro-

Indicating Millivoltmeter of the Two-Pivot Type

Galvanometer coil is supported on two hardened steel pivots mounted in two jeweled bearings, affording ruggedness to withstand reasonably severe usage encountered in many industrial plants.

Visible in this phantom view are: the permament magnet and pole pieces, one of the two calibrated hair springs which oppose the turning action of the coil, the light indicating pointer, and the indicating scale graduated in temperature units. The spool mounted immediately to the right of the permanent magnet carries resistance wire in series with the measuring circuit, and is used in calibrating the instrument.

A zero adjusting screw, shown protruding through the rear of the top cover makes it possible to set the pointer accurately at zero when the instrument is open circuited. When the instrument is used as a thermocouple actuated pyrometer with copper leads, and has no ambient temperature compensation, the pointer is set at the value of the cold junction temperature (measured at the thermocouple head by means of an accurate thermometer). When thermocouple extension wire is used, and the instrument includes automatic compensation, the pointer is matched with the compensating index (See triangular index extending up from below left end of graduated scale).



Electrical calibration is accomplished by adding resistance to or removing it from the circuit by adding wire to or removing it from the calibrating spool. Since the entire pyrometer measuring system includes the resistance of the thermocouple extension wire (or copper wire, if used), the calibrating resistance, and the resistance of the galvanometer coil, all of these resistances must be taken into consideration when adjusting the total circuit resistance to give the proper galvanometer deflection for a given emf.

meter is illustrated and several methods of mounting the galvanometer coil described.

The Millivoltmeter As A Controller

Because of the small amount of torque available from the rotating galvanometer coil, the millivoltmeter is, to some extent, limited in its capabilities as a controller. In general, there are two types of controllers in use. The mercury switch type utilizes a feeling mechanism which periodically feels the position of the instrument pointer, and opens or closes mercury switches as required when the pointer deviates above or below the desired set point. (The set point is that value of a measured variable which the controller is set to maintain.) This operation is cyclic rather than continuous and is not capable of providing some of the more complex forms of control action.

Another type makes use of a very light metal vane mounted directly on the indicating pointer. Movement of this vane between two oscillator coils causes snap-action of a control relay. The point at which this control action occurs (the set point) is adjustable, and is governed by the position of the oscillator coils which are attached to and move with the set point index.

The Millivoltmeter As A Recorder:

A feeling device, similar to the one described above, is again used. In this case, however, the mechanism makes a mark on a chart at periodic intervals, the location of the mark depending on the position of the pointer. Here again, the record is intermittent rather than continuous. This is objectionable only when the measured variable is changing at a rapid rate.

Advantages and Limitations

The millivoltmeter is the least expensive of the electrical temperature measuring instruments. Used as an indicator, it can operate in a location remote from any source of electric power. It contains very few moving parts, and, when installed in the proper location, i.e. free from dust, dirt and undue vibration, gives long, trouble-free service. Many of these instruments are in use on bake ovens, heat treating furnaces, and as excess temperature cut-off devices on furnaces controlled by other types of instruments. Since a millivoltmeter measures electrical quantities, it is not limited to use with thermocouples, nor is it limited to the measurement of temperatures. It is adaptable to use with resistance thermometer bulbs and radiation sensing elements in the field of temperature measurement, and, when employed with a tachometer generator, affords a means of measuring the speed of rotating parts or shafts.

There are several limitations to the millivoltmeter for over-all industrial use. It lacks sensitivity to very small temperature changes over narrow temperature spans. This is true because the amount of pointer deflection depends upon the amount of current flowing through the coil, and because a greater current is required to obtain one degree of pointer deflection from, say, the 45-degree position, than is required to obtain one degree of deflection from the 15-degree position.

Since the resistance of the electrical conductors between the temperature sensing element and the instrument is added to the over-all resistance of the measuring circuit, the allowable distance between the point of measurement and the instrument is somewhat limited.

The galvanometer assembly must of of necessity be lightly and accurately constructed in order to be responsive to small changes in millivoltage. For this reason, the instrument is, to some extent, susceptible to damage from severe vibration and mechanical shock.

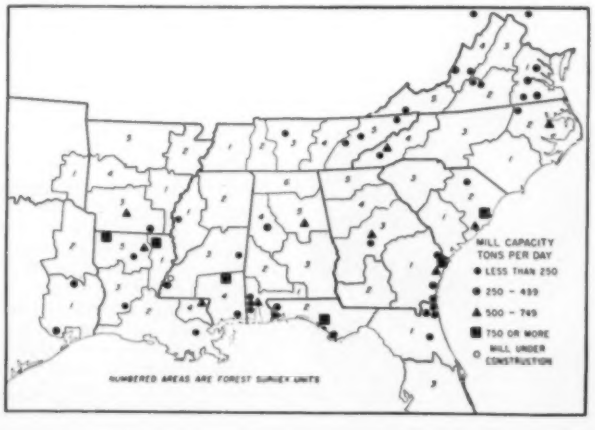
When used in dusty or dirty atmospheres, the galvanometer unit requires fairly frequent cleaning, as the clearance or air gap in which the coil rotates between the magnet pole pieces and the iron core is extremely narrow, and the presence of even a small amount of dust or dirt will cause faulty instrument operation.

◆

Southern Power & Industry is presenting this series on instrumentation to help plant and production engineers work out their process control problems. Rather basic in nature, the articles deal with variables commonly encountered in the plant and outline the principal means available for measurement and control. Part 5 in the April issue will cover Mechanical Potentiometers.

Pulp and Paper in the South

One of the South's relatively new industrial giants, which got its start in the chemical laboratory, is the pulp and paper industry. The extent of this still-growing activity is shown in this U. S. Forest Service map of pulp mills drawing raw materials from the South in 1949. Courtesy of the Journal of Southern Research.



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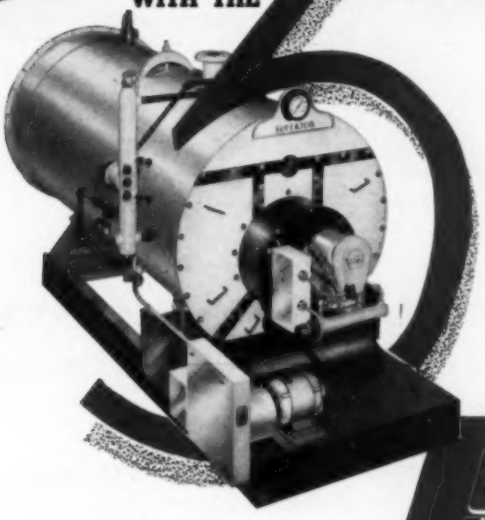

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High efficiencies developed on the job result in lower fuel costs. These same high efficiencies developed easily without pushing the steam generator result in lower maintenance costs and longer boiler life. The final result of course, is lower steam costs.

There are other features which contribute to the outstanding performance of Superior Steam Generators . . . multiple-fan induced down-draft which is built-in, combined with Superior 4-pass construction for higher efficiency . . . large evaporating surface for quick steaming . . . large steam space and dry pan to assure ample reserve steam capacity and 99.5% dry steam at the nozzle . . . and many other important features, each painstakingly developed through experience and research, to make a Superior Steam Generator the unit to cut your steam costs.

Superior Steam Generators are completely factory assembled, backed by undivided responsibility. Burn gas or oil, or both. Manufactured in 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. or for hot water.

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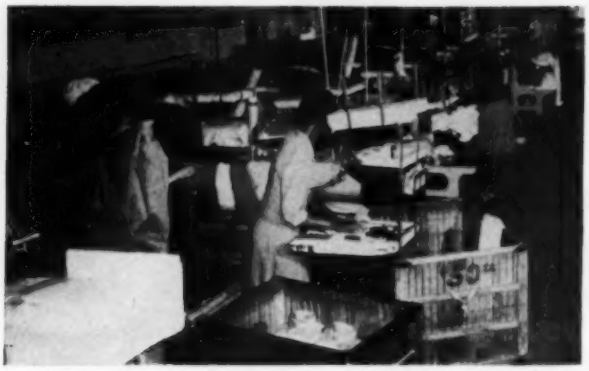


PRESS ROOM AT THE GRIFFIN LAUNDRY & DRY CLEANING COMPANY.

By John H. Griffith
Griffin Laundry & Dry Cleaning Co.
Griffin, Georgia

High Pressure Condensate System Improves Operation for Georgia Laundry

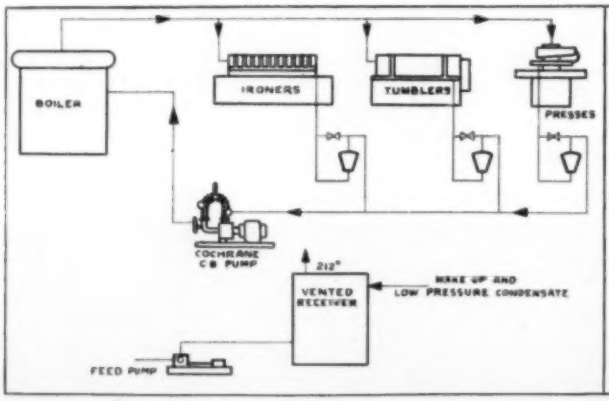
Elimination of steam flash has resulted in better employee relations, increased production, and fuel savings.

THE Griffin Laundry & Dry Cleaning Company at Griffin, Georgia, employs 120 operators plus the necessary overseers, checkers, and supervisors. For twenty-six years this company has been a leader in the use of the most modern and timesaving machinery and methods. All types of laundry and dry cleaning are handled with extreme care. Recently special equipment has been installed for laundering blankets—another assurance to its customers that here they can expect to receive the best in this type of service.

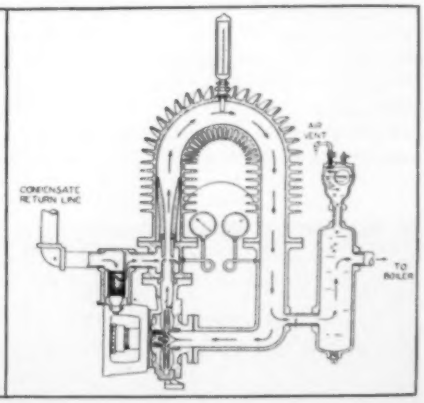
Heat Balance

The 150 hp boiler is fired with natural gas. Steam is generated at 100 to 115 psi pressure. Flatwork ironers, tumblers, and presses are operated at full boiler pressure. Originally condensate from the steam-using laundry equipment was returned to a vented receiver in which the condensate was cooled down to 212 F, resulting in a loss of approximately ten per

DIAGRAM SHOWING FLOW OF CONDENSATE THROUGH THE COCHRANE C-B HIGH PRESSURE CONDENSATE RETURN SYSTEM.



THREE HORSEPOWER COCHRANE C-B HIGH PRESSURE CONDENSATE RETURN SYSTEM.



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NOW! *Top Thermal Efficiency with* **GAS** *and* **OIL**

25 YEAR FEATURES FOR LOW COST STEAM IN 1976

Here's a new fuel-saving development worth noting! Preferred brings you a new principle in combination oil and gas burners. For the first time, *two burners* are used . . . each one specially designed to deliver the highest thermal efficiency for each fuel. *Both* the well-known Preferred Horizontal Rotary Oil Burner and Preferred's new dual, pre-mix type gas burner are built into each Preferred Combination Unit Steam Generator.

You get at least 80% guaranteed thermal efficiency for the life of the unit . . . no matter which fuel is used. There's no compromise . . no sacrifice of efficiency that often results when one burner is used for both fuels. Changeover from oil to gas, or vice versa, takes less than 20 minutes.

For overall economy, read about Preferred's distinctive 25-year features in the panel at right. Full details in Bulletin 1000. Write for your copy today.

Each distinctive feature of the Prefererd Unit Steam Generator is designed to give efficient, economical service for an average of 25 years with proper care and maintenance. You benefit by better performance . . . longer life . . . lower boiler costs.

1. **Anti-stress deck for tube sheet protection.**
2. **Special precipitator developed by Preferred as aid to safe, clean operation.**
3. **Staggered tube construction - minimizes possibility of tube pitting, even at low firing rates.**
4. **4600 rpm horizontal rotary oil burner with patented VOLUVALVE fuel regulation - designed and manufactured by Preferred - assures fully automatic operation even with No. 6 oil.**
5. **Self-cleaning induced draft fan with air cooled shaft and bearings - assures long life.**
6. **Down-draft gas travel, with Airlock design, for 80% thermal efficiency - proved and guaranteed.**
7. **Dual purging cycles for positive elimination of gas stratification.**
8. **4-pass, high velocity, gas travel - minimizes tube cleaning maintenance by self-cleaning action.**

PREFERRED UTILITIES MANUFACTURING CORP.

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PU-300

cent of the hot condensate as flashing steam to the atmosphere.

In order to reduce operating expenses a Cochrane C-B High pressure condensate return system was installed which has permitted the return of condensate direct to the boiler at about 325 F.

Condensate Return System

In the Cochrane C-B high pressure condensate return system a specially designed centrifugal pump draws water from the thermo-fin priming loop and discharges as a high velocity jet through the jet pump nozzle. This jet strikes the returned hot condensate and induces condensate flow through the venturi-shaped mixing tube and into the thermo-fin priming loop. The additional volume of condensate introduced into the constantly filled loop results in the discharge of an equal volume through the air separator to the boiler.

The hot condensate and entrained air are drawn rapidly and positively from the laundry equipment by the jet pump. The air is eliminated from the circuit by passing through the air separator and the condensate is returned to the boiler at maximum temperature and pressure. Thus the circuit from the boiler through the equipment and back to the boiler is completed in a closed system without substantial drop in temperature. Performance of the unit is verified by the pressure gauge on the inlet together with the pressure gauge.

This unit effectively prevents the condensate heat loss inherent in the previous open return system and is returning condensate at 325 F and up. Fuel costs have been reduced appreciably and laundry production has been satisfactorily speeded. With prompt removal of condensed steam, operators are able to increase their output per hour thus increasing their wages. Incidentally, this has assured the company of a continuing supply of more competent and better satisfied workers.

Unit Systems Vs. Interconnection

By
Joseph H. Drake
Reynolds, Smith & Hills
Jacksonville, Fla.

THERE has been a tendency in recent years to design plants with one boiler one turbine construction.

Where there is justification for such design the advantages are rather marked. In an interconnected system there are necessarily many maintenance jobs which require a shut down of two or more units, a rather serious occurrence in a small system. The unit system is readily adaptable to expansion and requires no extensive shut downs for additional cut-ins of new units. Interconnection makes it likely that trouble at one spot will be communicated to the other equipment throughout the plant, while in the unit system difficulties are confined to one unit. This means that a maximum number of men can be spared from their duties in other parts of the plant to cope with the isolated trouble spot. Any operator who has worked with both types of systems will testify to the fact that isolated units are far superior from an operating point of view.

The chance of a simultaneous loss of two major pieces of equipment is so remote as not to be considered when compared with the possibility of system wide trouble on the interconnected type of system. Also in the interconnected system emergencies are not so quickly analyzed as when the trouble is confined to one unit. Comprehension of the nature of the trouble and its location take longer and correction of the difficulty usually consumes more time. When the whole plant is involved in trouble there is a greater chance of personnel errors because more people are involved. Also, a correction measure made by one without the knowledge of the others may aggravate the trouble instead of correcting it.

The much greater simplicity of the unit system is most desirable. It tends to reduce operating personnel requirements and increases the ease of operation. The additional complication of the interconnected system increases maintenance costs to a considerable degree.

As pressures and temperatures increase the cost of piping becomes more and more a factor in the total cost of the plant. Interconnection for this reason alone tends to increase the initial capital expense without a commensurate increase in emergency capacity or in reliability of service. We believe that the seriousness and magnitude of interruptions to service are normally far less with the unit system than with interconnected units.

In addition to increased complication and cost of piping there are other factors which tend to increase the initial cost of interconnection. These include additional valves (especially automatic valves which are in themselves a source of trouble). The use of non-return valves is not required with the unit system. Increased pipe covering costs, easier operation of pumps because of the elimination of the necessity of paralleling, the use of smaller auxiliary equipment and decreased size of the building itself are other factors to be considered.

In conclusion, we believe that experience with one boiler-one turbine units will show decreased maintenance and operating costs, fewer serious interruptions to service and greatly increased reliability of power systems.

400° F.

350° F.

300° F.

250° F.

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● Processes requiring careful temperature control call for Yarway Impulse Steam Traps on steam equipment.

The reason? . . Yarway traps maintain even temperatures because they *continually* sample and respond to a trickle of the condensate. There is no arrest in flow, no waiting for large quantities of condensate to accumulate, or trapped steam pockets to condense.

Other reasons why Yarway Impulse Traps have become first choice in many thousands of plants:

- They get equipment hotter, sooner
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Stainless Steel Body

YARWAY IMPULSE STEAM TRAP

Research Facilities for Southern Industry

SASI's first annual directory to be widely distributed . . . covers institution, personnel, area of general interest, fields of specialization, contract policies . . . complimentary copies available to Southern industrial plants.

THE South, once handicapped by an almost complete lack of services and facilities for solving industrial-technical problems, has in recent years developed such a variety of well-equipped and well-staffed scientific consulting groups that problems in almost any field of industrial or scientific research can be undertaken within the region.

The extent to which these important services are now being used by local industrial and governmental groups is small in relation to their capacity, indicating that fuller utilization of these resources offers a great opportunity for regional development. SASI's directory will serve as an excellent guide for Southern and Southwestern industrial leaders.

THE purpose of the new SASI directory is to make available for easy reference the facilities and staffs of those laboratories in the South and Southwest which are in a position to conduct research for the industries of this area.

During the last decade, there has been a tremendous increase in the number and size of industries in the South and the research organizations associated with universities and non-profit research corporations in the South have had a comparable increase in numbers and productivity.

Industry must conduct research, both fundamental and applied, if it is to prosper. The large industry of tomorrow is built from the small industry of today through research.

Unfortunately, most of the Southern industries have not been doing the amount of research that they should be doing. It is believed that one of the contributing factors to this scarcity of research by industries of the South is lack of knowledge by the persons responsible for those industries on the procedures, availabilities and facilities of these research laboratories.

SASI hopes that their new directory will act as a catalyst to the industries of the area to do more industrial research.

Directory Limitations

In their first annual directory, SASI found it necessary to limit the listing to groups which now are conducting appreciable programs and which are willing to accept additional sponsored projects. Not included in the first directory are: universities and institutions not now engaged in appreciable programs; federal research laboratories; agricultural experiment stations; research groups active in

Research Directory Coverage

SASI's First Annual Directory of Southern Research covers 38 research groups which are now conducting appreciable programs and which are willing to accept additional sponsored projects.

Listings include name, address, director, key departmental heads, number of professional scientists, graduate students, technicians, and student assistants.

Contract research policies, areas of general interest, fields of specialization, and facilities or equipment of special value are included.

Supplemental data includes publication policies, library facilities, research capacity or volume, per cent of support obtained from Southern industrial firms and research capacity or volume of work now being conducted.

How to Use the Directory

Whenever a technical problem occurs in the industry for which no apparent ready answer is available, write to the nearest research laboratory or to the one which shows that it is working in an area associated with the problem.

If the answer to the problem is known, the research laboratory will be glad to refer the information to the inquirer. If the information is not known, the research laboratory officials will consult with the industry to determine how the proper solution may be reached, either through the industry's own laboratories or by contact with the proper research laboratory.

Southern and Southwestern executives can obtain a copy of the directory by writing the Southern Association of Science and Industry, 5009 Peachtree Road, N. E., Atlanta, Georgia.

Fifty years of steel making IN and FOR the SOUTH

March 5, 1951, marks the Golden Anniversary of Atlantic Steel Company.

From a small mill rolling hoop for rosin barrels and ties for cotton bales, employing only a handful of men, Atlantic Steel Company has grown into a full-fledged steel mill producing 65 different products in thousands of sizes, and employing more than 2,000 men.

Today the name DIXISTEEL is known throughout the South and from California to New England.

Founded by a small group of business men who had faith in the future and a desire to help build the South they loved, Atlantic Steel Company stands today a tribute to their vision.

Through all these years—through three major depressions and two World Wars—Atlantic Steel Company has been guided by firm business policies that have stood the test of time.

* * * *

We enter our second half-century with the greatest expansion program in our entire history —the best evidence of our continued faith in the future and the South.

ATLANTIC STEEL COMPANY

ATLANTA, GEORGIA

such fields as economics, law, public administration, and business; industrial laboratories operated by private firms or groups and which are not available to conduct research for others; commercial laboratories engaged in routine testing; and firms offering consultation in connection with the sale of their products.

Information on the following research establishments is included in the complete directory:

The University of Alabama, University, Ala.; Dr. John M. Gallalee, President.

The University of Arkansas, Institute of Science and Technology, Fayetteville, Ark.; W. W. Grigorieff, Director.

Atlantic Research Corporation, 812 North Fairfax St., Alexandria, Va., A. C. Scurlock, Director.

Auburn Research Foundation, Auburn, Ala.; Fred Allison, Director.

Black Laboratories, Inc., 700 S. E. 3rd St., Gainesville, Fla.; C. A. Black, Pres.

The University of Chattanooga, Industrial Research Institute, Chattanooga 3, Tenn., J. H. Coulliette, Technical Director.

Clemson College, Engineering Experiment Station, Clemson, S. C.; James H. Sams, Director.

Delta Electrical School, Inc., 239 Canal St., New Orleans, La.; Tracey C. Johnson, Director.

Duke University, Durham, N. C.; A. Hollis Edens, President.

Experiment, Incorporated, Deepwater Terminal Road at Bells Road, P. O. Box 1-T, Richmond, Va.

University of Florida, Engineering and Industrial Experiment Station, Gainesville, Fla.; Ralph A. Morgen, Director.

Florida State University, Department of Chemistry, Tallahassee, Fla.; Karl Dittmer, Director.

Georgia Institute of Technology Engineering Experiment Station and **The Georgia Tech Research Institute,** Atlanta, Georgia, Gerald A. Rosselot, Director.

Institute for Cooperative Research of the Johns Hopkins University, 1315 St. Paul St., Baltimore 2, Md.; Dr. W. B. Burford, III, Director.

University of Houston Research Institute, 3801 Cullen Blvd., Houston 4, Texas; H. J. Sawin, Director.

Kentucky Research Foundation, Affiliated with The University of Kentucky, Lexington, Ky.; Leo M. Chamberlain, President.

Harold A. Levey Laboratories, 8127-8133 Oleander St., New Orleans, La.; Harold A. Levey, Director.

Louisiana State University, Baton Rouge, La.; Harold W. Stoke, President.

University of Louisville Institute of Industrial Research, Louisville 8, Ky.; R. C. Ernst, Director and President.

University of Maryland, College Park, Md.; Ronald Ramford, Acting Dean, Graduate School.

The University of Miami, Inc., Coral Gables, Fla.; Bowman F. Ashe, President.

Middle South Area Office, 211 International Trade Mart, New Orleans, La.; L. M. Tognoni, Director.

Mississippi State College, State College, Miss.; Fred T. Mitchell, President.

The University of Mississippi, University, Miss.; J. D. Williams, Chancellor.

North Carolina State College Engineering Research Department, Raleigh, N. C.; William G. Van Note, Director.

University of Oklahoma Research Institute, Norman, Okla.; Verne H. Schnee, Director.

Oklahoma Agricultural and Mechanical College, Stillwater, Okla.; Philip S. Donnell, Vice President.

Rollins College Department of Chemistry, Winter Park, Fla.; Ralph W. Wager, Director.

Southern Research Institute, 917 South 20th St., Birmingham 5, Ala.; William M. Murray, Jr., Director.

South Florida Test Service, 4201 Northwest Seventh St., Miami 34, Fla.; Earl M. DeNoon, Director and Owner.

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas; Harold Vagtborg, President and Director.

Stillco Laboratories, 201 East 18th St., Sarasota, Fla.; Eugene U. Still, President and Director.

University of Tennessee Engineering Experiment Station, Knoxville 16, Tenn.; N. W. Dougherty, Director.

University of Texas Bureau of Engineering Research, 104B Engineering Bldg., Austin, Texas; W. R. Woolrich, Director.

Texas A. & M. Research Foundation, College Station, Texas; A. A. Jakkula, Executive Director.

Timber Engineering Company, 1319 Eighteenth St., N. W., Washington 6, D. C.; H. G. Uhl, President.

Vanderbilt University, Nashville, Tenn.; Harvie Branscomb, Chancellor.

Virginia Institute for Scientific Research, 326 North Boulevard, Richmond 20, Va.; Allan T. Gwathmey, President.

Virginia Engineering Experiment Station, Virginia Polytechnic Institute, Blacksburg, Va.; Earle B. Norris, Director.

Directory Distribution

SASI will seek to place copies of the directory in the hands of as many influential industrial leaders as possible. Steps are being taken to have trade associations, technical societies, industrial firms, and others to sponsor the production and mailing of reprints throughout the nation. Industrial development agencies are being asked to handle the distribution of copies in each Southern state.

The First Annual Directory of Southern Research Services and Facilities as compiled by Mr. H. McKinley Conway, Director, SASI, is published in the January-February, 1951 issue of *The Journal of Southern Research*, official publication of the association.

Preliminary comments on the South's research resources are authored by Mr. R. A. Morgen, Director, Florida Engineering and Industrial Experiment Station, and Chairman, SASI Research Committee.

To obtain your copy of this extensive directory, write H. McKinley Conway, Director, Southern Association of Science and Industry, 5009 Peachtree Rd., Atlanta, Georgia.

Fields of Basic Research

Some fields of special competence identified by the survey include:

Air Pollution — dusts, fumes, gases

Ceramics — Clays, refractories, structures, whitewares

Chemical Processes—distillation, drying, extraction, plastics, rubber, solvents and synthetics

Coal Technology — by-products, burning characteristics, processing

Food Technology — processing, packaging, preserving

Forest Products Technology—forestry, paper and pulp, wood manufacturing, waste utilization, wood adhesives

Power Plants—combustion, engines, fuels, lubricants, stokers

Protective Coatings — corrosion, paint technology, weathering, solar radiation

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CENTER FIRING WITH BOTH FUELS ASSURES EQUALLY SATISFACTORY OPERATION WITH EITHER FUEL

ANY AIR TEMPERATURE MAY BE USED

WRITE FOR LITERATURE

JOHN ZINK COMPANY

4401 South Peoria **Tulsa, Oklahoma**

Helping the MAN-IN-THE-PLANT

Readers are invited to send in kinks, ideas, and suggestions. Payment is made for all material accepted.

Casting Cleaning Time Reduced

KING Plow Co., Atlanta, Georgia, produce gray iron agricultural castings. They had been cleaning these castings with three tumbling mills. This was not satisfactory, for they couldn't clean their approximately 7 tons daily production in 8 hours time. Consequently the cleaning room men were always working overtime.

To overcome this condition King Plow Co. installed a 36" x 42" Wheelabrator Tumblast. With this machine, an airless abrasive blast cleaning machine manufactured by American Wheelabrator and Equipment Corp., Mishawaka, Indiana, they clean the previous day's production in 2½ hours.

Castings that were tumbled 45 minutes or more, are now cleaned better in six minutes. Parts without cores came out satisfactorily in 5 minutes.

This was only the beginning of the advantages they found with the Wheelabrator method of cleaning. The peening action imparted to the chilled iron plow shares, wings, etc. increases the fatigue life of these parts, thus enabling King to offer a better product at no increase in cost.

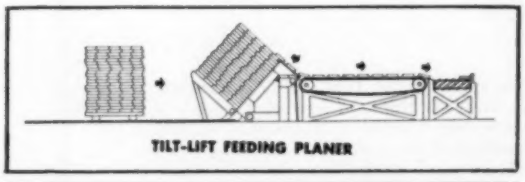
With the faster cleaning, the morning following the casting, all discounts can be checked and brought to the attention of the molder for correction while his recollection of the conditions of the day before are fresh in his mind.

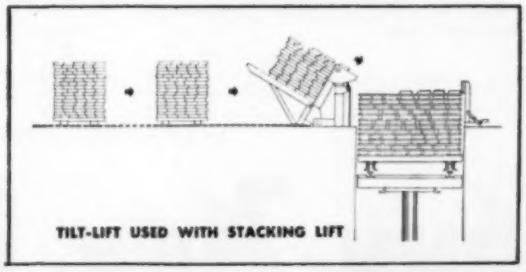
The better and faster cleaning operation produces better appearing castings, and the finish imparted by the Wheelabrator blast cleaning leaves an excellent finish for painting.

Savings in Lumber Handling

BRADLEY Lumber Co., Nickey Bros., Inc., and other leading companies report up to 50% saving in labor costs through use of the Oildraulic Tilt-Lift. It is one of the greatest advances ever made in lumber handling methods and equipment and can be adapted to a variety of uses.

Lumber packages are moved onto the Tilt-Lift by a chain or roller conveyor, on which the lumber has been deposited by straddle or fork lift truck. The Tilt-Lift then raises and tilts the lumber package so that boards easily slide off. As work progresses the lift rises hydraulically to keep the top of the stack at the most efficient and convenient working level. The equipment is manufactured by Rotary-Lift Company of Memphis, Tenn.





TYPICAL OPERATION OF LEVA-DOCKS, MANUFACTURED BY ROTARY LIFT CO. OF MEMPHIS.

CHECK POINT FOR MATERIALS HANDLING EFFICIENCY . . . WHERE HORIZONTAL MEETS VERTICAL

Today you're facing tough problems. And the solution to these problems calls for constant checks on every operation to cut out inefficiencies.

When you come to checking your materials handling system, don't overlook the point where your hand and power trucks meet your freight elevators. For unless your freight elevators are a planned part of your overall handling system, supplies and parts can't move smoothly . . . and your handling costs climb fast.

To help you plan your vertical transportation for peak efficiency, Westinghouse offers "The Buyer's Guide for Freight Elevators", B-4402. This is the most complete source of vital information available on the proper selection and application of freight elevators. For your free copy of this book, write Westinghouse Electric Corp., Elevator Division, Dept. U, Jersey City, N. J.

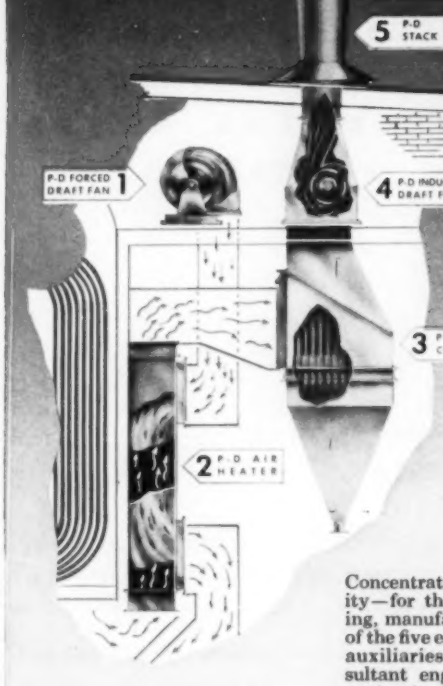
WESTINGHOUSE FREIGHT ELEVATORS

YOU CAN BE SURE...IF IT'S Westinghouse

J-98606

UNIT RESPONSIBILITY

. . . from one source pd



the 5 essentials for handling the air-gas stream

Concentrating the responsibility—for the design, engineering, manufacture and delivery of the five essential boiler plant auxiliaries, relieves the consultant engineer and general contractor of this problem.

The Thermix Corporation, project engineers for Prat-Daniel equipment are glad to offer you their wide background in the proper application of (1) P-D Forced Draft Fans; (2) P-D Air Heaters; (3) P-D Tubular Dust Collectors (standard Valmont and Decantation); (4) P-D Induced Draft Fans; (5) P-D Fan Stacks.

Your over-all plan is simplified when the complete responsibility for the production and control of gas is placed with P-D, a firm known to the Utility and Power fields for over a quarter of a century. This unit responsibility means less details for you.

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Designers and Manufacturers

PRAT-DANIEL CORPORATION

EAST PORT CHESTER, CONN

Control of Outdoor Power Equipment

THE new Industrial Canal Steam Electric Generating Station of New Orleans Public Service, Inc., incorporates many modern features of design. One of the most outstanding features is the use of semi-outdoor construction. Practically the only part of the station which is under a roof is the control room. Boilers and generating equipment are almost entirely outdoors.

Combustion Control

Combustion control equipment is the Leeds & Northrup Metermax system. This equipment fits the station's requirements well, because its all-electric drive units are designed to work outdoors without need for any extra protection from the weather. On the boiler and turbine control panels are Micromax Superheat Temperature Control; and Micromax recorders for temperatures of air, water and steam, electrolytic conductivity of feedwater, condensate and steam, and for per cent CO_2 in flue gas.

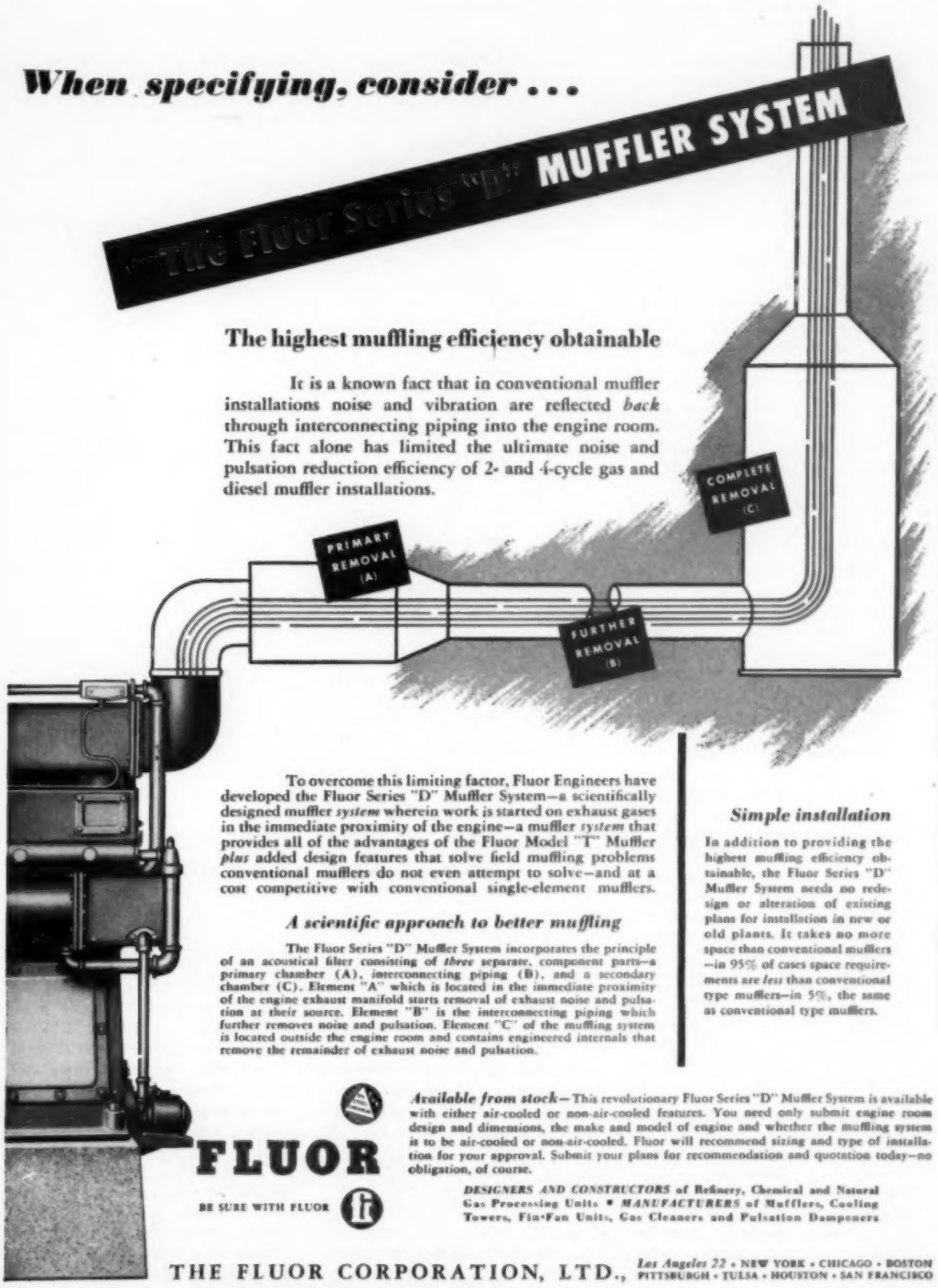
MOUNTED OUTDOORS, THIS METERMAX ELECTRIC DRIVE UNIT AT INDUSTRIAL CANAL STATION NEEDS NO PROTECTION FROM WEATHER—OPERATES RELIABLY WITHOUT ANY SPECIAL ACCESSORIES.

When specifying, consider . . .

The Fluor Series "D" MUFFLER SYSTEM

The highest muffling efficiency obtainable

It is a known fact that in conventional muffler installations noise and vibration are reflected *back* through interconnecting piping into the engine room. This fact alone has limited the ultimate noise and pulsation reduction efficiency of 2- and 4-cycle gas and diesel muffler installations.



To overcome this limiting factor, Fluor Engineers have developed the Fluor Series "D" Muffler System—a scientifically designed muffler *system* wherein work is started on exhaust gases in the immediate proximity of the engine—a muffler *system* that provides all of the advantages of the Fluor Model "T" Muffler *plus* added design features that solve field muffling problems conventional mufflers do not even attempt to solve—and at a cost competitive with conventional single-element mufflers.

A scientific approach to better muffling

The Fluor Series "D" Muffler System incorporates the principle of an acoustical filter consisting of *three* separate, component parts—a primary chamber (A), interconnecting piping (B), and a secondary chamber (C). Element "A" which is located in the immediate proximity of the engine exhaust manifold starts removal of exhaust noise and pulsation at their source. Element "B" is the interconnecting piping which further removes noise and pulsation. Element "C" of the muffling system is located outside the engine room and contains engineered internals that remove the remainder of exhaust noise and pulsation.

Simple installation

In addition to providing the highest muffling efficiency obtainable, the Fluor Series "D" Muffler System needs no redesign or alteration of existing plans for installation in new or old plants. It takes no more space than conventional mufflers—in 95% of cases space requirements are *less* than conventional type mufflers—in 5%, the same as conventional type mufflers.

Available from stock—This revolutionary Fluor Series "D" Muffler System is available with either air-cooled or non-air-cooled features. You need only submit engine room design and dimensions, the make and model of engine and whether the muffling system is to be air-cooled or non-air-cooled. Fluor will recommend sizing and type of installation for your approval. Submit your plans for recommendation and quotation today—no obligation, of course.

FLUOR

BE SURE WITH FLUOR

DESIGNERS AND CONSTRUCTORS of Refinery, Chemical and Natural Gas Processing Units • *MANUFACTURERS* of Mufflers, Cooling Towers, Fin-Fan Units, Gas Cleaners and Pulsation Dampeners

THE FLUOR CORPORATION, LTD., *Los Angeles 22* • NEW YORK • CHICAGO • BOSTON PITTSBURGH • TULSA • HOUSTON • SAN FRANCISCO

Welded Economizer Returns

AN economizer is a device that uses waste flue gases to heat feedwater, and, generally speaking, for every 10 degrees the temperature of the feedwater is raised, there is a gain of 1 per cent in boiler efficiency. Under favorable conditions, fuel bills may be lowerel from 7 to 20 per cent.

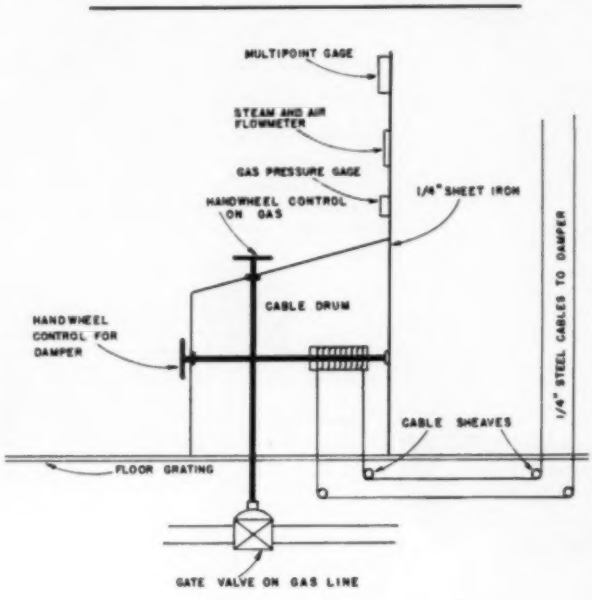
There are two types of fuel economizers. One is an integral part of most boilers built in the last decade for large central stations. The other is independent of the boiler. It was introduced about 1900 and eventually became virtually standard equipment. Since 1900-1940 was a period of vast expansion of power plant facilities, the independent type of economizer is in widest use, although the integral type is now preferred.

Directional changes in the tubes are ordinarily made with U-bends or by the use of header boxes. When the first method is employed, the tubes are upset, faced and fitted with companion flanges. A thin gasket is placed between the flanges and the assembly is held together by two bolts. It is at the flanged joints, or at the header boxes, that costly leakage inevitably develops. Repairs are inconvenient to make, sometimes entail expensive shut-downs, and add to maintenance overhead.

Until recent years, there was no satisfactory remedy for the problem brought about by leakage of the tubes at the joints. Impurities in the feedwater caused scale to form on the insides of the tubes, or otherwise impaired their usefulness, and the conventional connections made it possible to mechanically clean them periodically, whenever the condition warranted the labor involved.

Seamless Welded Fittings

Today, however, improved treatment of feedwater reduces the deposits of impurities in the economizer's tubes, thus eliminating, in most instances, both the need for periodic cleaning of the interiors and the need for the troublesome flanged joints or header boxes. These changed circumstances make possible the solution to the vexing problem of tube leakage, which has for so long plagued plant engineers. It consists of discarding the mechanical joints and refabricating the tube assembly with Tube-Turn 180-degree welding fittings. Properly welded, the tubes are then permanently leak-proof, and, in addition, provide optimum flow conditions. This again is the familiar story of welded lines, equipped with Tube-Turn forged welding fittings, replacing inadequate connections where critical factors are involved—a story that has been repeated throughout industry since 1927, when Tube Turns, Inc., Louisville, Ky., introduced the first seamless welding fittings for industrial piping.



Instruments and Controls

THE accompanying sketch shows one of the four manual control devices used by a Southwestern Steam-Electrical plant for controlling natural gas and air to four Springfield boilers. When I first started to work for the company their method of control was a poor one, as we firemen had to walk (most of the time run) a distance of about forty feet from the meter board to regulate the air damper levers in order to take care of the swinging lead. The gas fuel valves were so situated, we had to bend over as if we were fixing to do a hundred yard dash in order to operate them.

The superintendent wasn't any too well pleased with his turbine throttle pressure, for the pressure chart showed we only hit on the required pressure now and then. So he made a remote control device out of scrap iron material at a slight cost. After that, we maintained such a constant turbine throttle pressure he had his meters checked and recalibrated to assure himself that we really were "on the beam. Our gas flow meters showed a considerable saving in fuel, and we firemen can now stand in one place and regulate the amount of gas and air to the furnaces almost simultaneously.

. . . for proof of better pumping performance!

It's been said that split-case centrifugal pumps look pretty much alike. But looking alike does not mean "like" performance!

We've lifted the casing of a Fairbanks-Morse Single-Stage Split-Case Centrifugal to show you why you get *better* performance . . . *lower* maintenance costs with Fairbanks-Morse . . . to show you important design and manufacturing differences.

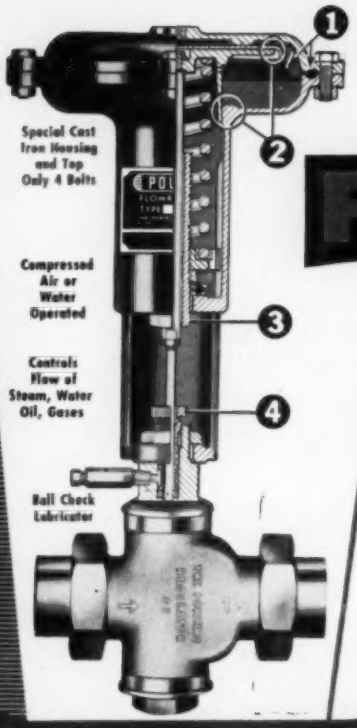
Note the sturdy construction and exceptional strength provided by the arched casing and solid pump base . . . the ease with which the entire pump can be inspected or the entire rotating element removed without disturbing driver or pipe connections. Exceptionally smooth water passages reduce friction and "back eddies" to the minimum. Bearing brackets, cast integrally with pump body, maintain accurate, permanent alignment of shaft and impeller. Smooth, one-piece impeller reduces wear and maintains efficiency. Impeller is pressed on shaft over a key so that the key also drives the shaft sleeves and prevents destructive rotation of the sleeve on the shaft. Removable casing and impeller wearing rings assure easy maintenance and have streamlined water guiding surfaces for maximum pump efficiency.

These are but a few of the many performance-making features you'll find in Fairbanks-Morse Centrifugals. Your Fairbanks-Morse Pump expert will be happy to give you the complete story on these efficient, economical pumps. See him or write Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE,

a name worth remembering

PUMPS • SCALES • ELECTRIC MOTORS
GENERATORS • LIGHT PLANTS • DIESEL,
DUAL FUEL AND GASOLINE ENGINES



POWERS FLOWRITE VALVE

VALVE TOP—Durable moulded neoprene diaphragm (1) has positive sealing bead which provides increased sealing action with increasing control pressure. Efficient diaphragm form insures ample and constant operating power thru full travel. Piston Plate Assembly (2) has a free floating thrust plate which absorbs side thrust. Closely guided piston plate maintains stem in accurate alignment.

ADJUSTING SCREW—Ball bearing non-rising type. Easily accessible, 180° turning radius with starting pressure adjustable from 0 to 17 psi. Has enclosed rust proofed steel spring for full travel in 5 or 10 psi. control pressure change.

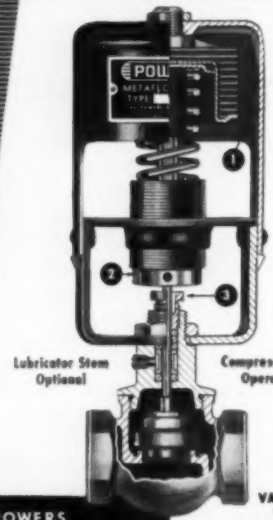
BONNET ASSEMBLY—Polished stainless steel stem in preformed lubricated metallic packing insures long life and low hysteresis.

VARIETY of VALVE BODIES — Sizes ½" thru 8"—For line pressures below 250 psi. Rugged construction to withstand piping strains. Single seat or double seat, bronze and stainless steel trim. Double unions and flanged ends. Available normally open (direct acting) or normally closed (reverse acting) and 3-way type valves.

POWERS BETTER Valve Tops

Get TOP Performance
Reduce Maintenance

Packless Valves Available



POWERS METAFLOW VALVE

VALVE SIZES—½" thru 2"

Bronze bodies, screwed ends. Rugged construction to withstand piping strains.

POWERS *Metaflow Valves* are small, sturdy, light-weight, reasonably priced, suitable for many control applications where the pressure differential does not exceed 75 lbs. per square inch.

1. **HOUSING**—High strength aluminum alloy. Hydraulically formed long life brass bellows provides smooth and powerful stroke.

2. **ADJUSTING SCREW**—Brass with rust proofed steel spring having 15 lbs. adjustment range to give proper sequence operation where required.

3. **BONNET ASSEMBLY**—Polished stainless steel stem in preformed lubricated metallic packing insures long life and low hysteresis.

TRIM—Composition disc with brass integral seat and self-aligning disc holder. Available normally open (direct acting) or normally closed (reverse acting), and 3-way.

METAFLOW NO-PAK VALVES prevent leakage of inflammable or harmful liquids or gases and provide vacuum protection. Are suitable for use with Freon, oil, gasoline, non-corrosive gases, hot or cold water and low pressure steam.

Phone or Write Nearest Office for Prices

THE POWERS REGULATOR CO.

OFFICES IN OVER 50 CITIES • See Your Phone Book

CHICAGO 14, ILL., 2720 Greenview Ave. • NEW YORK 17, N.Y., 231 E. 46th St.
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142 Spring St., N.W., ATLANTA, GA.

OVER 58 YEARS OF PNEUMATIC TEMPERATURE CONTROL

(PM.3)

Notes on Metal Finishing

By A. J. Hereford
Tesco Chemicals, Inc.
Atlanta, Georgia

WHAT is the best preparation to get optimum paint adhesion? There is considerable confusion about this question because many finishers have a lot of ideas on the subject. Most of them will confess, however, if they are honest with themselves, that they do not definitely know just exactly what it takes to get the results desired. There are a great many products offered by chemical manufacturers, and some of them are good, but many positively are not adequate.

Manufacturers of metal products are interested in permanent adhesion. They want a finish which will stand up in service, rather than just long enough to get the product out the door without the paint peeling off. They are interested in how the product will look a year or two after it leaves the factory. Good finish promotes sales and bad finish stops them. This is reflected all the way up from the user to the dealer and jobber.

Out of our experience and observation in production in the field, on the paint testing board, and in the laboratory, we have set up qualifications—known facts, tests, and measurements of desired residual conditions after metal treatment that are required to get permanent adhesion. We are passing our findings along to the users for what they are worth. We think they should be of value.

Here is what we believe it takes:

1. A chemically clean surface.
2. A surface free of corrosion stimulants.
3. A surface compatible with paint.
4. A surface which will tightly grip paint.
5. A corrosion proofed surface.
6. A smooth surface.

For a better understanding, we amplify these requirements, outlining tests and established facts:

1—**A clean surface** is free of oil, grease, corrosion, and dirt. A surface free of water break is free of oil and grease. Visual inspection will show corrosion, and wiping with a clean rag will show residual dirt.

2—A test for **corrosion stimulants** is not necessary, if either phosphoric or chromic acid, or some of their proper derivatives are used for treatment. These chemicals neutralize corrosion stimulants.

3—Metal treated with these same chemicals will be **compatible with paint.** The surface should also be slightly acid (5 pH) to best hold the paint. Acid test paper applied to the treated surface will indicate the acidity.

4—The best surface to **hold paint** is one treated with the phosphoric process to produce a zinc-phosphate crystal. A heated phosphatizing process will produce the amount of crystal desired to meet requirements, and provide the best paint adhesion possible. A cold phosphoric process will deposit a minute crystal coating which is usually adequate for good adhesion on products not subject to considerable wear or highly corrosive con-

New Heavyweight Classification

Here's the business end of Yale & Towne's new 80,000 lb capacity industrial lift truck. Weighing-in at 84,000 lb, unit will lift 80,000 lb. Lifting height is 91-in. and turning radius 168-in. (14 ft aisle).

Unit is powered by a 165 Cummins Diesel engine driving a 90 kw G.E. locomotive type generator.

Built for the steel industry, this giant truck is designed to slash handling time and hike output of cold rolled strip steel.

On front of the truck are two huge, snout-like rams that open and close like a scissors. These unique rams provide a unit that can carry one large coil of steel or two smaller ones.

It's the first of a new series of ram and fork trucks now available in capacities from 20,000 to 100,000 lb.

ditions. A slight etch has considerable holding power, but is not as reliable as a crystal coating. A deep etch is not dependable for tight adhesion.

5—The best **corrosion proofing** is produced by a hot phosphatizing process which deposits on the metal surface a smooth fine grained hard inert crystal coating—tightly held and integrated with the metal. The corrosion proofing is in proportion to the thickness and quality of the crystal. Etching does not produce any corrosion proofing.

6—**A smooth surface** is essential to a smooth finish. This is particularly true today because single coat finish is used extensively without primer, filler and sanding. Coarse surfaces result in dull rough paint coats. This is forcefully demonstrated by any attempt to paint wood or brick surfaces with a spray gun. Paint bounces out of cracks, crevices, holes, and depressions—and tends to magnify the roughness. Paint does the same thing over deeply etched metal. A fine minute etch provides a smooth paint coat. Adhesion in such cases is much tighter. There is less metal lost, less time for processing is required, and less chemical used. Fine sized crystals of best quality will produce tightest adhesion, more corrosion proofing, and the smoothest paint coat.

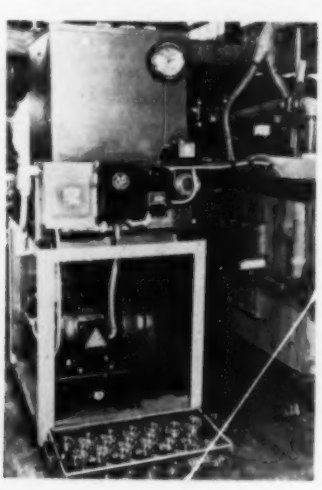
Refrigeration Solves Bearing Manufacturing Problem

IN the New Departure plant excess heat posed a costly problem on the production line in the manufacture of precision bearings. According to J. J. Curry, Resident Manager, the difficulty hinged around one of the assembly lines where a temperature rise occurred during a necessary oil-washing operation and caused inaccurate gauging of bearings because of expansion. This, in turn, interfered with the smooth production flow and resulted in increased stock handling because the bearings had to cool for several hours to reach room temperature before they could be accurately gauged to match other precision parts.

A Frigidaire commercial refrigeration engineer was assigned the task of clearing up the problem. He found that a five horsepower pump used in the washing operation generated enough heat to raise the temperature of recirculating fine oil bath as much as 30 degrees above room temperature. It was not accurately determined how much the actual bearings were warmed; but the additional heat created was sufficient to cause gauge readings to be off as much as several ten thousandths of an inch.

Once the facts were known, the answer was fairly simple. Refrigeration equipment comprised of a 25-gallon cooling tank and a one horsepower water-cooled reciprocating Frigidaire compressor was installed to keep the oil bath at room temperature. The supply of oil in the tank is maintained at about 50 degrees.

A thermostat in the regular oil storage tank controls a solenoid valve for the system, permitting the introduction of low temperature oil to mix with warm recirculating oil. Mr. Curry has reported that the Frigidaire cooling system has solved the problem completely.



SIDE VIEW OF THE FRIGIDAIRE COOLING SYSTEM USED TO KEEP AN OIL BATH AT ROOM TEMPERATURE ON A PRODUCTION LINE TURNING OUT PRECISION BEARINGS.

Cut Motor Downtime

THE modern trend is toward protective construction for electrical machinery. Settling of dust and dirt on open type motors combine with moisture and oil to make a sticky grime requiring extensive man hours to clean as well as decreasing the useful life of insulation and bearings.

Water and other liquids dripping or splashing into the motor is also highly deleterious to the windings and moving parts of the motor and results in costly repairs. The long hours of maintenance and high rate of downtime are expensive liabilities to any plant.

AN ELECTRIC MACHINERY MFG. CO. 100HP SQUIRREL-CAGE INDUCTION MOTOR INSTALLED OUT-OF-DOORS AT A HOUSTON, TEXAS PAPER MILL.

The savings made from decreased maintenance time and increased production time of each motor are much greater, proportionately, than the increased cost for protective construction. An example of motor operation under extremely rugged conditions, where protective construction is a necessity, is this view of a 100 hp squirrel-cage induction motor installed out-of-doors. It is in use by a paper company in Texas and is driving an outdoor pump. Protective construction in this case means the difference between continuous operation with minimum maintenance and long motor downtimes with high maintenance costs.

Continental ELEVATORS

TYPICAL GRAIN ELEVATOR

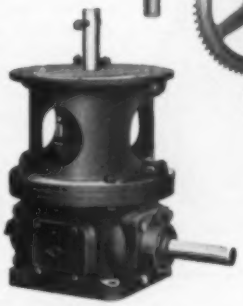
BUCKETS (ALL TYPES)

TAKE-UPS

PILLOW BLOCKS

SPEED REDUCERS

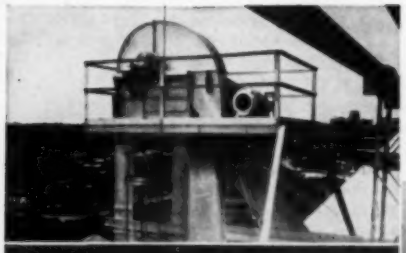
TOP DRIVE



BOTTOM DRIVE

SPROCKETS AND CHAIN

SCREW ELEVATOR WITH FEEDER SECTION



Continental offers a complete line of Standard Bucket and Screw Elevators. Special units designed to suit unusual conditions. Standard accessories and Power Transmission Equipment carried in stock.

Let Continental furnish your next installation.

CG-5004

SECOND FLOOR

THIRD FLOOR

FIRST FLOOR

Industrial Division CONTINENTAL GIN COMPANY Birmingham, Alabama

NEW EQUIPMENT for Southern Industry

Free additional information is available to readers of Southern Power & Industry. Check item code number on the postage free service coupon post card provided on p. 17.

Industrial Oil Burner

D-1 THE COPPUS ENGINEERING CORPORATION, Worcester, Mass., has announced the marketing of a new Coppus-Dennis FANMIX Oil Burner, which is said to have six major advantages.

The new burner utilizes steam under pressure to atomize oil into the smallest possible particles. These particles are then discharged through rapidly rotating orifices and thrown outward into a cylindrical "sleeve" of air. This air-fuel mixture is projected into the furnace by a fan, which is rotated by the jet reaction of the steam-atomized oil. This violent mechanical mixing of the atomized oil and air brings the oxygen molecules together with the hydrocarbon molecules of the fuel, resulting in rapid and complete combustion and consequently a very short flame pattern.

Among the advantages claimed for the new Coppus-Dennis FANMIX oil burner are increased boiler ratings, increased fuel efficiency, elimination of hot spots, elimination of forced draft equipment, a cut in stack requirements and reduced coking of atomizers.

The oil burner is so designed that the fan's power requirement coincides with the power developed from the reaction force of the steam atomized oil. If the amount of fuel is increased, the speed of the fan increases, thus automatically maintaining the proper fuel-air ratio.

Packings And Gaskets

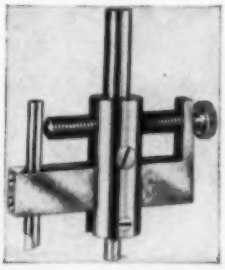
D-2 THE GARLOCK PACKING COMPANY, Palmyra, N. Y., has introduced a line of packings and gaskets made of "Teflon", a tetrafluoroethylene resin developed by E. I. duPont de Nemours & Company. The products are said to be extremely inert to chemicals, heat resistant, tough and durable; they are designed to solve the problem of sealing against acids and chemicals of all kinds.

The manufacturer states that these packings and gaskets are unaffected by any acid and are highly resistant to all organic solvents and alkalies; that they operate at temperatures from below -90 F up to 500 F, and have high mechanical strength and a low coefficient of friction within that temperature range.

The company produces several types of braided and molded "Teflon" packings for use on valves, pump rods or shafts and other equipment. For gasketing flanged joints of all kinds, including glass and porcelain flanges, envelope gaskets made of a suitable material encased in "Teflon" or gaskets made of solid "Teflon" are available in required sizes and shapes.

Circle Cutter

D-3 PRECISE MEASUREMENTS COMPANY, 942 Kings Highway, Brooklyn 23, N. Y., is now marketing the Micro Circle Cutter which cuts holes in metals, plastics, and wood.



The cutter is adjustable in an infinite number of hole diameters; a micrometer type adjusting screw assures precise settings; and the beam may be locked for easier and quicker operation.

Two types are available: round shank for drill presses; or hand drills and square tapered shank for hand braces. Maximum hole diameter is 4 inches for the first model and 6 inches for the other. All are equipped with a ¼ inch high speed steel cutting bit.

In any typical power plant installation, the *difference in cost* between the best possible combustion control system and a "second best" system is less than the cost of the fuel burned in one week.

The *difference in performance*, though it may be as little as ½ of 1% of fuel consumption, means a fuel saving *every year of operation* of two to four times as much as the difference in cost.

Here is how it works out in three typical power plants, assuming 6,000 hours of operation per year and a life of 20 years—which is considerably less than the useful life of the average boiler—and using current average fuel prices, which are not likely to decrease within the foreseeable future.

CASE No. 1

Plant Cost	$1,600,000
Boiler Capacity—100,000 lb/hr steam	
Estimated cost of simplified control system	25,000
Estimated cost of best possible control system	30,000
Fuel cost over a 20-year period, minimum	4,800,000
Fuel cost over a 20-year period, maximum—not less than	6,000,000

Saving on fuel by using best possible control, estimated at ⅓ of 1% — from $24,000 to $30,000.

IN COMBUSTION CONTROL SYSTEMS

anything less than the best is too expensive-

CASE No. 2

Plant Cost	$ 8,250,000
Boiler Capacity—500,000 lb/hr steam	
Estimated cost of simplified control system	45,000
Estimated cost of best possible control system	65,000
Fuel cost over a 20-year period, minimum	24,000,000
Fuel cost over a 20-year period, maximum—not less than	30,000,000

Saving on fuel by using best possible control, estimated at ⅓ of 1% — from $120,000 to $150,000.

CASE No. 3

Plant Cost	$ 42,000,000
Boiler Capacity—2,500,000 lb/hr steam	
Estimated cost of simplified control system	55,000
Estimated cost of best possible control system	90,000
Fuel cost over a 20-year period, minimum	120,000,000
Fuel cost over a 20-year period, maximum —not less than	150,000,000

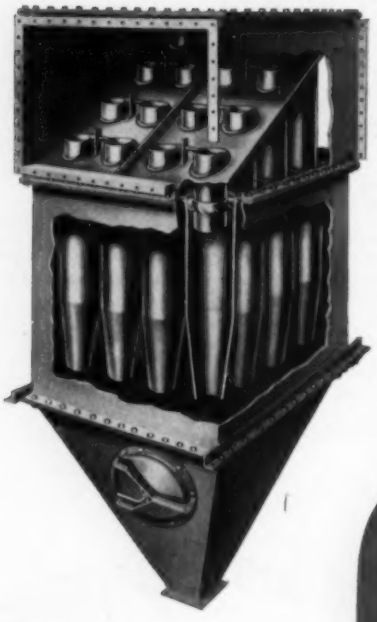
Saving on fuel by using best possible control, estimated at ½ of 1% — from $600,000 to $750,000.

The thousands of Hagan Combustion Control Systems, installed in plants of all types and sizes, in all parts of the country, are your assurance that Hagan Control in your plant means maximum efficiency with the minimum maintenance throughout the life of the boiler. Our engineers will be glad to provide full information. Hagan Corporation, Hagan Building, Pittsburgh 30, Pennsylvania.

HAGAN HALL BUROMIN CALGON

HAGAN CORPORATION

BOILER COMBUSTION CONTROL SYSTEMS
RING BALANCE FLOW & PRESSURE INSTRUMENTS
METALLURGICAL FURNACE CONTROL SYSTEMS
THRUSTORQ FORCE MEASURING DEVICES



No wonder "MULTICLONE" is the leading name in the centrifugal recovery of dust and fly ash from all types of gases, hot or cold.

No other mechanical recovery equipment has so many years of dust and fly ash recovery experience behind it . . . or has such uniformly high collecting efficiency . . . or provides so many other money-saving, space-saving advantages as MULTICLONE. The four advantages outlined below are by no means the complete MULTICLONE story, but are typical of the vital savings found *exclusively* in MULTICLONE equipment . . .

In dust and fly ash recovery

MULTICLONE COLLECTORS

***and only Multiclones* give vital advantages like these . . .**

Uniformly High Recovery:

MULTICLONE's multiple *small diameter* tubes—made possible by its exclusive vane design—whirl the dirty gases with greater centrifugal force, thus throwing out not only the large, medium and small particles, but also a high percentage of the *extremely small* particles of 10 microns and less. This, coupled with the fact that there are no pads or filters to become choked with recovered material, results in a more complete recovery of *all* suspended materials from the gas stream.

Long and narrow

Square

Maximum Adaptability:

In addition to its unusual compactness, the MULTICLONE is also unusually adaptable to various installation requirements. Where head room is low it can be installed with side-inlet side-outlet connections. Where side clearances are restricted, it can be installed with side-inlet top-outlet connections. In addition, without changing capacities, the shape of the unit can be varied—long and narrow, short and wide, or square—to fit restricted spaces . . . and its single-inlet single-outlet duct requirements permit greater flexibility and simpler installation. These savings slice installation costs, space requirements and insulating expense.

Space-Saving Compactness:

Plant space costs money—so be sure to check space requirements carefully. As shown in the accompanying chart, the MULTICLONE requires less floor space and less cubic space than any other unit of comparable capacity and performance. Translate these savings into today's high costs for plant space and you readily see the great importance of this one MULTICLONE advantage alone!

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.6	3.9

Minimum Maintenance:

The MULTICLONE has no high speed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. MULTICLONE draft losses remain uniformly low *at all times*. Further, the recovered material from an entire bank of tubes is collected in a *single* hopper—far easier to service and maintain than the multiple hoppers of conventional cyclone units.

FREE INFORMATIVE BOOKLET
This 32 page booklet outlines the basic principles of centrifugal dust recovery and shows the many ways MULTICLONE advantages assure higher recovery at lower overall costs. A free copy of this booklet will gladly be sent on request. Write today!

Before you decide on any recovery equipment be sure to get complete information on MULTICLONE advantages. A letter, wire or phone call to our nearest office places this information in your hands without obligation. Get all the facts and you will get MULTICLONE Collectors!

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1052 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 LaSALLE ST. BLDG., 1 N. La SALLE ST., CHICAGO 2 • HOBART BUILDING, SAN FRANCISCO 4, CALIFORNIA
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

Arc Welder

D-4 HOBART BROTHERS COMPANY, Hobart Square, Troy, Ohio. have developed a special 300 amp gasoline driven arc welder with a 3 kw auxiliary power generator, designed for industrial repair and maintenance operations.

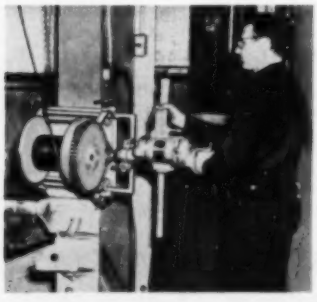
The arc welder and generator form a self-contained unit, powered by a 6-cylinder self starting Chrysler Industrial Engine directly connected to the welding generator and mounted on a welded steel frame. An auxiliary 3 kw power generator provides for lights and such tools as a lathe, grinders, drills, brake reliner, valve refacer, chipping hammers, power wrenches, and paint sprayers.

The welding generator is rated at 40 volts, 300 amp under one hour resistance load at 1500 rpm and has a current range from 50 to 400 amp. Cooling is accomplished by a squirrel cage fan.

◆

Portable Drill—Power Hoist

D-5 SKILSAW, INC., 5033 Elston Ave., Chicago, Ill., has introduced a new tool which can be converted from portable drill to power hoist in a matter of minutes. A simple adapter kit that requires no special tools for mounting locks the "Skill Drill and "Handi-winch" in alignment, which, according to the manufacturer, assures safe, large capacity hoisting on all jobs.



The drill can be taken out of the hoist bracket for use in drilling jobs. The manufacturer recommends it for all types of heavy maintenance and installation work.

With a hoisting capacity of 1,000 lb at 10 fpm, the combination is designed for use by contractors, machine shops, foundries, garages, and warehouses.

SAVE IN INSTALLATION!

The spherically-ground, true ball joint of a Dart easily gives a snug, drop-tight fit. There's no need for fussing — no need for excessive wrenching — no lost time in installation.

SAVE IN MAINTENANCE!

This same design feature makes uncoupling fast and easy, too. And you'll find the seats clean and unmarred—ready for re-installation without any time loss.

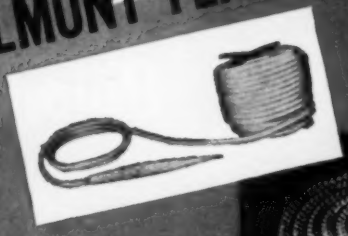
What's more, Darts save in other ways. The bronze-to-bronze seats have highest resistance to pitting and corrosion; body and nut of high-test, air-refined malleable iron are practically indestructible. Thus a Dart lasts years longer—eliminates the replacement costs of inferior unions.

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston New York Pittsburgh

DART UNIONS

specify...

BELMONT FLAX PACKINGS



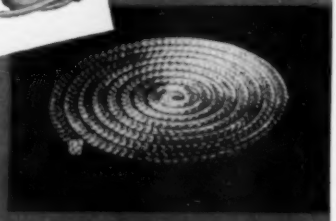
...for better sealing... longer life. Don't gamble when making a packing replacement, make sure you select and GET Quality Flax Packings and the right type to fill your requirements.

To play safe, just say, "Give me Belmont," when you next order flax packings and you'll be reducing maintenance costs. Quality and special constructions are Belmont features. Specialists select raw materials — engineers make the designs and expert craftsmen produce all the world-famous Belmont styles right in the Belmont plant.

For better sealing . . . longer life Belmont Packings—ask for them in the blue box with the orange colored trade mark. Distributors located in every large industrial center are ready to serve you. Or, if engineering help on your job is required, write direct.

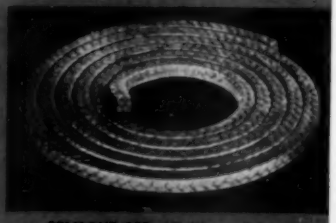
Catalog #40 is available.

THERE'S A BELMONT PACKING FOR EVERY SERVICE



BELMONT 401X (Coil or Reel) — Best quality Line Flax Fibre of selected length and strength.

BELMONT 404 (Coil) — Pure flax fibre of next fibre length to Line Flax.



BELMONT 303 (Coil) — Line Flax of selected quality, with coarse and short fibres extracted. Treated with waterproof lubricant, and surface graphited.

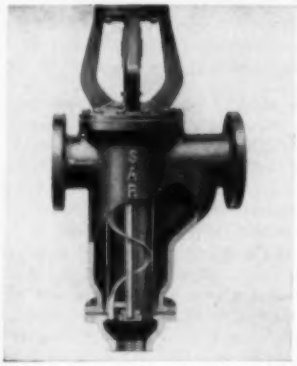
THE BELMONT PACKING AND RUBBER CO.
Butler and Sepviva Streets
Philadelphia 37, Pa.

BELMONT
PHILADELPHIA U.S.A.

RINGS • SPIRALS • COILS • REELS
SPOOLS • SHEETS • GASKETS

Scraper Strainers

D-6 SARCO COMPANY, INC., Empire State Bldg., New York 1, N. Y., is marketing a line of scraper strainers designed to remove solids or scums, without interruption of flow, from any fluid: paints, tar fuel, resins, river water, syrups, wax, brine, etc.



The scraper strainer is said to eliminate shutdowns and the labor consuming job of removing and cleaning dirty strainer screens. The Manufacturer states that it eliminates the hazard of foreign particles being forced through a dirty screen, and permits the use of closer mesh screen.

◆

Portable Electric Hammer

D-7 SKILSAW, INC., 5033 Elston Ave., Chicago 30, Ill., has announced a portable electric hammer of simplified design with only one working part. The new model incorporates a specially designed power unit consisting of two

FREE READER SERVICE
To obtain free information on this equipment, circle number on the page 17 free post card.

alternately energized magnetic coils, eliminating gears, cranks and connecting rods.

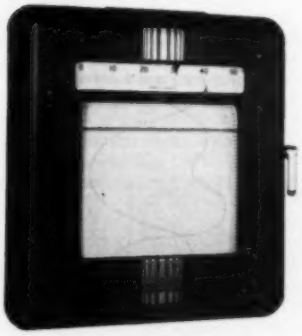
The hammer, which strikes 3,600 blows per minute, is applicable for drilling and channeling in concrete; vibrating concrete forms; chipping; scaling and cleaning of many materials.

The 1-1/8" hammer has an efficient operating range of 3/4" to 1-18" diameter star drills and extreme operating limits of ⅜" to 1½" diameter star drills. It is 16" long and weighs 20 lb.

◆

Electronic Recorder

D-8 LEEDS & NORTHRUP COMPANY, 4934 Stenton Ave., Philadelphia 44, Pa., have announced a new 2-pen electronic recorder, which records two functions simultaneously against time. The instrument saves tedious compilation and point-by-point plotting of data. Since both functions are drawn as continuous curves on a 9-7/8" wide chart, users can follow swift-changing variables with ease.



Two separate electronically-amplified measuring circuits, two balancing motors, and two recording pens are all housed in one standard case. Circuits can be supplied to work with thermocouples, Thermohms, strain gages, tachometers, thermal converters, pH cells, or most other types of primary elements. The instrument can operate controls or alarms.

These EVERLASTING advantages give better service from

Fig. 4001/6561. Duplex unit consisting of Straightway Lever-operated Sealing Valve and Angle Blowing Valve.

BOILER BLOW-OFF VALVES

When you install an EVERLASTING Duplex Blow-Off Unit, you'll find that its many superiorities speak for themselves.

The sealing valve at the left is the EVERLASTING design that has been famous for more than 40 years . . . the valve with the drop-tight seal that actually improves with use because of its self-lapping action each time the valve is opened or closed . . . the valve that can't stick or jam because of its non-wedge design . . . the valve that opens in less than a quarter turn to provide unimpeded straight-through blow.

The blowing valve at the right is the equally famous EVERLASTING Angle or "Y" Valve, specially designed and equipped to withstand repeated blow-off shocks, erosion and corrosion, and without pockets that might trap and hold solids.

Each of these valves . . . and all the other EVERLASTING Boiler Blow-Off valve types, fully meet ASME code requirements . . . assurance that they are properly designed and amply strong for the service.

Write for descriptive bulletin

EVERLASTING VALVE CO.
49 Fisk Street, Jersey City 3, N. J.

Fig. 4001/6571. Duplex unit consisting of Straightway Lever-operated Sealing Valve and Y Blowing Valve.

Fig. 6571/6561. Duplex unit consisting of Y Sealing Valve and Angle Blowing Valve.

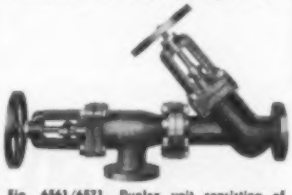


Fig. 6561/6571. Duplex unit consisting of Angle Sealing Valve and Y Blowing Valve.

Everlasting Valves

TRADE MARK "EVERLASTING" REG. U.S. PAT. OFF.

EV-340

FOR EVERLASTING PROTECTION

ACCURATE

Liquid Level Readings AT REMOTE POINTS with the JERGUSON TRUSCALE GAGE

Available with Visible and Audible Alarms and Repeaters at auxiliary points.

THE Jerguson Truscale Gage reproduces your boiler water, deaerating tank, or other liquid level at remote points with accuracy as close as ½ of 1%. This is made possible by a design which transmits movement changes in a mercury-filled manometer through a specially designed featherlight pointer system. A unique magnetic coupling, with a magnetically energized yoke operating on precision bearings, uses the maximum of coupling force available with a minimum of inertia in the pointer system.

The extreme sensitivity and close accuracy of the Jerguson Truscale Gage gives you *dependable liquid level readings at remote points.* The Truscale Gage has a built-in adjustment for easy calibration for any W.S.P. The dial is illuminated, the scale markings and pointer glow in the dark, and the gage is available with visible and audible alarms.

Investigate this exceptional remote reading liquid level gage. Write for data unit on Jerguson Truscale Gage.

JERGUSON

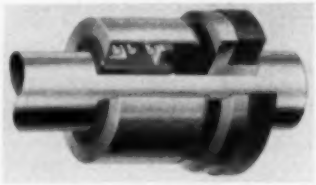
Gages and Valves for the Observation of Liquids and Levels

Representatives in Major Cities
Phone Listed Under JERGUSON

JERGUSON GAGE & VALVE COMPANY
100 Fellsway • Somerville 45, Mass.
European Mfg. Affiliate: Bailey Meters & Controls, Ltd.

Mechanical Seals

D-9 THE GARLOCK PACKING COMPANY, Palmyra, N. Y., is now offering a complete line of rotary seals for use where leakless operation of a rotary shaft on a pump or other equipment is required.



Sealing is effected by leakless and positive contact between lapped metal-to-carbon or metal-to-metal mating surfaces. One of these elements rotates with the shaft and the other is stationary. The stationary element does not contact the shaft.

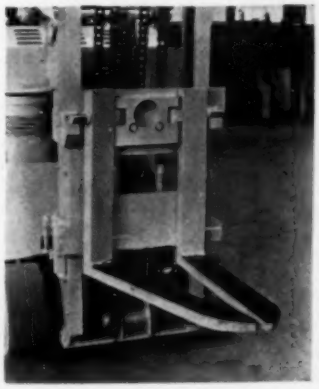
The seals are made in several designs and a wide range of materials.

•

Pivoted Fork Tines

D-10 ELWELL-PARKER ELECTRIC Co., 4205 St. Clair Ave., Cleveland 3, Ohio, has developed vertically pivoted forks for use on high-lift power industrial trucks to meet requirements in factories, warehouses, and shipping departments where loads frequently are maneuvered in congested areas. The device is furnished as an integral part of some models of the company's fork trucks, or may be supplied as an attachment for standard model fork trucks. The tines are used either in the ordinary way or may be quickly adjusted for unusual conditions relating to size or position of the load.

Each tine of the fork is adapted to swing inward from normal straight



FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

forward position, facilitating its entrance into a pallet or under a skid. The tines may be set so their points almost come together in the form of a V, or so that one tine remains in normal position while the other is moved over far enough for the outer end to touch it. With either adjustment it is not necessary for the truck and pallet to be in alignment as a preliminary to lifting or depositing a load.

◆

Control Instrument

D-11 TAYLOR INSTRUMENT COMPANIES, 95 Ames St., Rochester 1, N. Y., has developed a force-balance, non-indicating controller for pneumatic transmission systems.

The new controller is designed to give faster, more accurate measurement of rapidly changing temperatures and pressures; closer process control with stability; continuous process records on a 30-day strip chart, together with all other features needed for efficient remote control—all in 4-3/8" x 5" miniature pneumatic receiver.

The new instrument, known as the "Tri-Act" controller, can be either locally or panel mounted and is for use on temperature, pressure, flow or liquid level applications. Further details are furnished in Bulletin 98097.

◆

Conveyor

D-12 INDUSTRIAL ENGINEERING & MFG. CO., Brimfield, Indiana, manufacturer of Universal industrial conveyors and expanded metal floor trucks, has added a new conveyor model to its line. The new conveyor is only five feet in length, and is designed for use where a small conveyor unit is practical.

The unit is equipped with an 8-inch neoprene impregnated belt with flights 1⅜ inches in height spaced on 18-inch centers. Belt speed is approximately 125 fpm. Pulleys are equipped with permanently lubricated and sealed ball bearings.

Unit is powered by a 1/12 hp motor mounted inside conveyor channel. The model is shipped complete, ready for operation.

THE BEST GLASS INSULATION IS CELLULAR GLASS...

the only cellular glass insulation is PC Foamglas

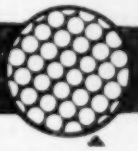
You can install PC Foamglas Insulation—indoors and outdoors, on tanks and towers, on heat exchangers, retorts and other large vessels—with full confidence that you will find its efficient, long lasting, trouble-free service completely satisfactory.

The only material of its kind, Foamglas is an exceptionally effective insulation. In addition, Foamglas is an exceptionally long lasting material . . . lasts so long that it becomes your "cheapest" insulating material. PC Foamglas, when properly installed, retains its original insulating effectiveness.

When next you figure on insulation, consider the advantages you get with Foamglas on a cost per year basis. If you are facing special insulating problems, our specialists will be glad to consult with you. Meanwhile, you will find a lot of helpful information in our current literature. Just send in the convenient coupon and our booklet will be forwarded promptly, with a sample of PC Foamglas.

Preformed sections of PC Foamglas are available for standard pipe sizes and fittings. Installation is quick and easy. Photo courtesy of North Brothers, Atlanta, Ga.

PC Foamglas, on sides and head of this evaporator will help maintain the 280°F. to 320°F. temperatures required for drying "green" wood prior to creosoting. Photo courtesy of Taylor-Colquitt Company, Spartanburg, S. C.



This diagram shows how a group of glass bubbles which contain still air, can form a continuous, cellular material. The black area is glass, the white space is air. PC Foamglas, the cellular glass insulating material, consists of glass and still air, makes an excellent barrier to heat travel. And, being glass, Foamglas has unusually high resistance to moisture, vapor, fumes and acid atmospheres, is noncombustible, odorless and verminproof. In this cellular glass construction lies the secret of the long lasting insulation value of PC Foamglas.

Pittsburgh Corning Corporation
Dept. AE-31, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me without obligation, a sample of Foamglas and your FREE booklet on PC Foamglas for industrial insulation.

Name.....

Address.....

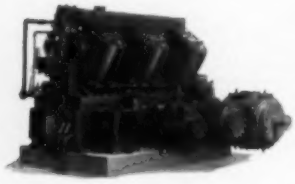
City..... State.....

PITTSBURGH PC CORNING FOAMGLAS cellular glass INSULATION

When you insulate with **FOAMGLAS** *... the insulation lasts!*

Gas-Engine Compressor

D-13 INGERSOLL-RAND COMPANY, Phillipsburg, N. J., has announced its new SVG gas-engine-driven compressor. The new model retains essential features of the previous ones but has been improved and modernized. The new compressor is built in two sizes—330 hp with six cylinders and 440 hp with eight cylinders.



New design features include crank angles of 120 degrees on the 6-cylinder unit and 90 degrees on the the 8-cylinder unit; two power cylinders per compressor frame; lightweight aluminum power pistons with low inertia forces; and shaft counterweighting. An increased compression ratio saves fuel.

Additional information is given in the manufacturer's bulletin, Form 3128.

•

Hydraulic Bender

D-14 WALLACE SUPPLIES MFG. CO., 1300 Diversey Parkway, Chicago 14, Ill., is now producing a small compact bending machine only 21" wide x 34" high x 78" long. The unit is designed for space saving, but is said to have power well beyond its capacity of 1¼" O. D. x No. 16 B.W.G. steel tubing. It is powered by a standard 2 hp, 220/440 volts, 3-phase, 60 cycle motor.

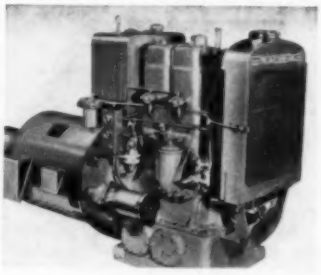
The machine is operated by a single lever which when pushed down causes the bending arm to swing around to the degree of bend selected and stay there until the operator has removed the bent part, then the lever is moved up and the arm swings back to its original position.

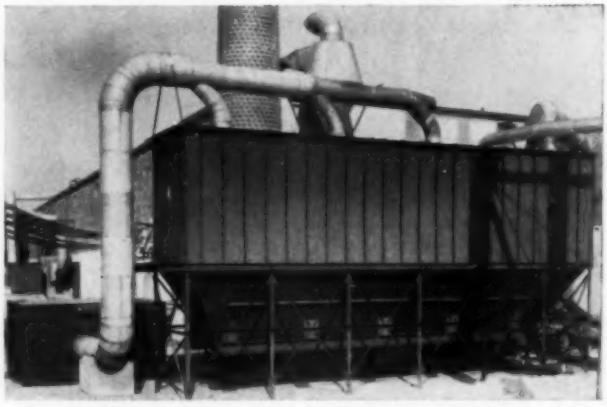
The bending die is held on by spring clips, for easy changing. This die is a combination with four different sizes, one to each side.

Diesel Engine

D-15 NORDBERG MANUFACTURING COMPANY, Milwaukee 7, Wis., has announced the addition of a two cylinder engine to supplement the single cylinder, 10 to 15 hp Diesel engine for use in the small power field. The new engine, rated at from 20 to 30 hp within an operating speed range of 1200 to 1800 rpm, has a 4½" bore and 5¼" stroke. It is an extra heavy duty, vertical, four-cycle, mechanical injection engine.

The new engine is built as a complete, self-contained, ready to operate unit and is offered as an electrical generating set, pumping unit and with





AT STEEL HEDDLE—One of four tubular dust collectors which clean, filter and recirculate 80,000 cubic feet of conditioned air per minute at the Greenville, S. C. plant of Southern Shuttles, a division of Steel Heddle Mfg. Co. This complete dust removal system was engineered, fabricated and installed by Dixie.

FREE DATA BOOK—

Dixie Catalog 47-B, "Dust Collectors" contains valuable data, charts and tables relating to dust control equipment. Write for your free copy today.

Here's really efficient dust control---

Southern Shuttles, the world's largest producers of wooden shuttles, uses a Dixie system to clean, filter and recirculate air at their plant in Greenville, S. C. The efficient Dixie system, engineered to the precise requirements of this plant and coordinated with its air-conditioning system, not only provides excellent working conditions but actually saves money. It conserves and re-uses conditioned air, thereby greatly reducing the load on the air conditioning system; it reduces maintenance costs and provides saw dust and chips to the boiler rooms for use as fuel. The designing and engineering skill that produced this highly efficient installation can produce a system that will exactly meet your needs. Write for free data book today.

DIXIE

MANUFACTURING CO., INC.

1337 RUSSELL ST. BALTIMORE 30, MD.

FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

clutch or stab shaft take-off for direct connection or belt drive.

The unit is designed to generate light or power for shovels, cranes and magnets, sand and gravel plants, saw mills, oil fields, and for standby service.

◆

Steam-Jet Cleaner

D-16 LIVINGSTONE ENGINEERING COMPANY, 100 Grove St., Worcester 5, Mass., is now offering a low cost "Speedylectric" steam-jet cleaner for use in small industrial plants. The unit, known as the JC-10, requires only 18" x 14" floor space and can be maneuvered through narrow aisles. It weighs less than 100 lb and is equipped with 8" rubber-tired wheels to provide maximum portability.

The JC-10 uses steam from the built-in high pressure Speedyelectric boiler. Small quantities of solvents are used effectively and economically since they are not diluted by mixing with gallons of water at the jet.

◆

Transformer Panel

D-17 THE CLEVELAND CHAIN & MFG. CO., Cleveland 5, Ohio, has announced a new swing-out transformer panel which facilitates servicing and adjustment of Bob-Cat electric cable hoists.

On this hinged panel is mounted the supply line transformer which reduces current at the push-button control to 110 volts. By swinging this transformer and its contactors out of the way, motor brake is made readily accessible for routine adjustments.

The new panel is standard equipment on all Bob-Cat models having push-button controls.

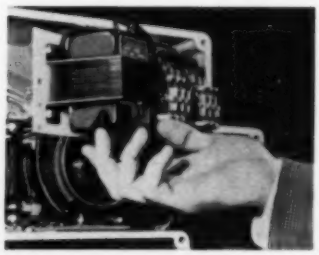


Fig. 0611, 188M Wedge Gate Valve, Working Pressures: 125 lbs. Steam, 200 lbs. WOG.

KENNEDY JOB-FITTED

Iron-Body Wedge Gate Valves

YOU SAVE TIME AND MONEY all along the line with Kennedy iron-body wedge gate valves because they are JOB-FITTED . . . every valve specially designed and engineered for the job it has to do.

THE WEDGE DISC is a cored casting of thick metal section, reinforced by integrally-cast interior posts and provided with openings to drain in any position.

HEAVY BRONZE DISC RINGS are forced into dovetailed grooves in the disc in a practically inseparable construction.

HIGHER STRENGTH IRON in the body and bonnet is actually 50% stronger than ordinary cast iron . . . and far exceeds A.S.T.M. requirements.

ALL CONTACT SURFACES between moving parts are bronze-to-bronze to assure easy operation.

RUSTPROOFED STEEL BOLTS AND NUTS have ample clearance to prevent distortion. Open-end wrenches may be used . . . no need for special tools. Valves can be repacked under full pressure.

EVERY FEATURE of the valve helps it do the job better . . . gives you a solid guarantee of economy and dependability whenever you install one of these Kennedy Job-Fitted Wedge Gate Valves.

BUY FROM YOUR LOCAL DISTRIBUTOR

WRITE FOR BULLETIN 107

THE **KENNEDY**
VALVE MFG. CO. • ELMIRA, N.Y.

Est. 1877

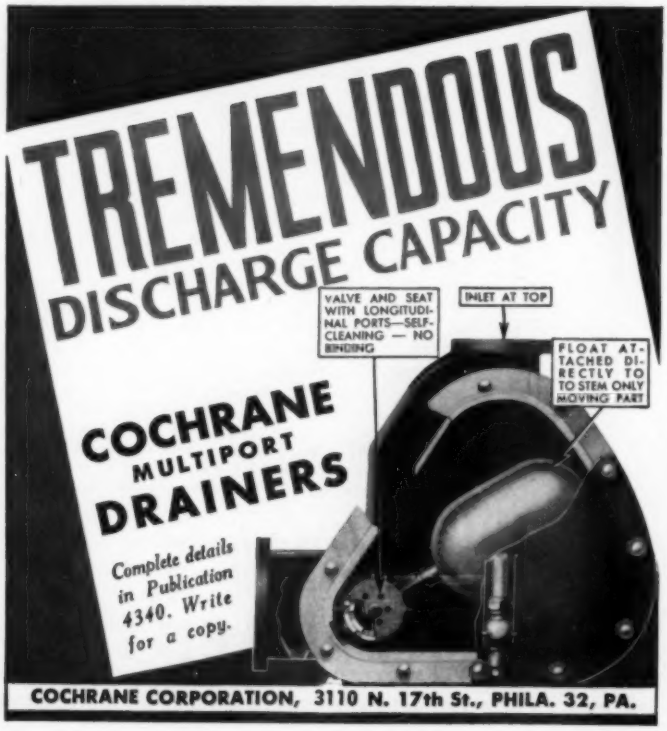
VALVES • PIPE FITTINGS • FIRE HYDRANTS

High Temperature Refractory

D-18 NORTON COMPANY, Worcester 6, Mass., manufacturers of grinding wheels, grinding machines and refractory products has announced a new high temperature refractory product—fused stabilized zirconia, which will withstand temperatures up to 4600 F.

Refractory offers the following combination of properties: resistance to high temperature, low thermal conductivity, high strength at elevated temperatures and its ability to resist oxidizing and reducing atmospheres at high temperatures.

Applications for a variety of molded shapes include furnace lining bricks for gas synthesis, heating elements for electric furnaces, containers and conveyors for molten steel and thermal insulation.


TREMENDOUS
DISCHARGE CAPACITY
VALVE AND SEAT WITH LONGITUDINAL PORTS—SELF-CLEANING — NO BINDING
INLET AT TOP
FLOAT ATTACHED DIRECTLY TO TO STEM ONLY MOVING PART
COCHRANE
MULTIPORT
DRAINERS
Complete details in Publication 4340. Write for a copy.
COCHRANE CORPORATION, 3110 N. 17th St., PHILA. 32, PA.

Dry-Type Transformers

D-19 GENERAL ELECTRIC COMPANY, Transformer and Allied Product Divisions, Pittsfield, Mass., has announced new hermetically sealed dry-type transformers with Class B insulation, which permits a reduction in prices.

Tests in the company's laboratories indicate that Class B materials in a nitrogen atmosphere can be satisfactorily operated at 180 C temperature previously assigned only to Class H materials.

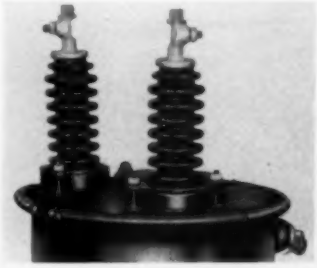
The new transformers are available in ratings up through 1500 kva and 15,000 volts. They can be supplied with metal-clad switchgear for load center installations or with network protector and high-voltage switch as a completely equipped network unit.

The new hermetically sealed transformers are said to considerably broaden the field of application of the dry-type transformer. They can now be installed either outdoors, where there is no exposure to lightning, or indoors. They can be installed underground where moisture, dust, lint, corrosive fumes, etc., have previously required either the use of liquid-filled units, or excessive maintenance on conventional open dry-type transformers.

•

Distribution Transformers

D-20 WAGNER ELECTRIC CORPORATION, 6400 Plymouth Ave., St. Louis 14, Mo., has developed a new cover clamp to provide true sealed tank construction for its line of distribution transformers. The clamp consists of a ring of V shaped cross section which fits over the edge of the cover and the lip of the tank. This ring is tightened by means of a single bolt; the pressure it exerts is equal at all points, so that the cover gasket is uniformly compressed to form a positive seal between the cover and the tank. No



FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

"breathing" can take place, and there is no danger of oil leakage during shipment or handling. Drainage channels are provided to prevent water from accumulating on the transformer cover. The cover clamps are designed especially for use on the company's distribution transformers having cores of cold-rolled oriented grain steel.

◆

Turbine-Generator Units

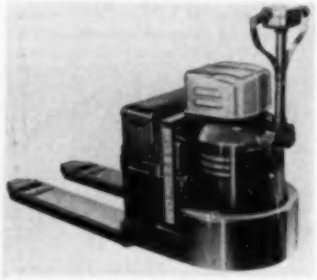
D-21 ALLIS-CHALMERS MANUFACTURING COMPANY, 954 S. 70th Street, Milwaukee, Wis., has announced the WA-Series steam turbine-generator units, a modern line presently developed in 500 to 7,500 kw ratings.

Being steam turbine driven units, they can operate with economical regenerative feedwater heating cycles and can also be tied-in thermodynamically to provide a steam-power balance where low pressure process steam is utilized. Governor and regulating characteristics provide for paralleling with existing units and tie-lines.

◆

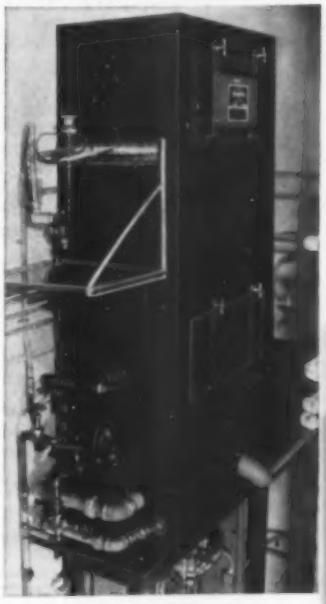
Electric Pallet Truck

D-22 TOWMOTOR CORPORATION, 1226 E. 152nd St., Cleveland 10, Ohio has announced a new and improved electric pallet truck. The model is a compact, powerful, pallet-type truck built to handle pallet-loads weighing up to 4,000 lb. Among the new features are a contractor panel, a positive-action brake with dead-man control, improved dif-



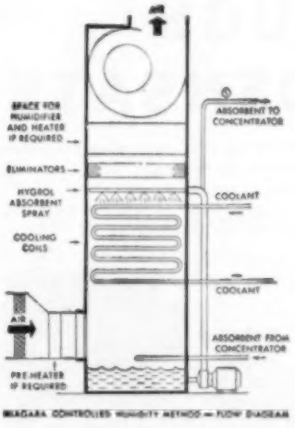
New "Controlled Humidity" Method Gives a Better Solution to Air Conditioning Problems

"Hygrol" Absorbent Liquid Dehumidifies Fresh Air Without Refrigeration



NIAGARA Air Conditioners or Dehumidifiers using "Hygrol" liquid absorbent give precise control of air temperature and humidity... at lower operating cost, with large savings in space and with smaller and less expensive equipment, in many applications.

This method dehumidifies the air by passing it through a chamber in which "Hygrol" spray removes its moisture and produces a low dew point. The "Hygrol" solution resulting is continuously and automatically re-concentrated, providing always full capacity in air conditioning and assuring always a constant dehumidifying capacity and a trustworthy, constant condition for your material, apparatus, process or room to be conditioned.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

Write for Bulletin 112

"Hygrol" is a liquid, not a salt solution; it stays pure and non-corrosive; it does not cause maintenance or operating troubles in food plants or in chemical processes.

Investigate this new Niagara Method for "comfort" air conditioning as well as to protect quality in hygroscopic material, or processes or instruments, or to prevent condensation damage to metals, parts or products.

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. SP, 405 Lexington Ave. **New York 17, N. Y.**

Experienced District Engineers in all Principal Cities

ferential action, and all-rubber, dual trailer wheels for smoother operation. Controls are located for finger-tip operation with either hand.

◆

Pyrometer Equipment

D-23 GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y., has announced new pyrometer equipment which is said to offer accurate temperature indication, close temperature control of industrial processes and protection for furnaces, ovens and kilns. The complete line consists of flush-mounted or surface-mounted indicators, controllers and protectors.

Designed for industrial applications that include heat treating furnaces, brick, cement or ceramic kilns; melting furnaces, cooking kettles, plastic molding machines, impregnating tanks and cloth-treating ovens, the instrument has a calibrated accuracy within 3/4 of 1 per cent of full scale. A legible 7-inch scale, fitted with an anti-glare cover, indicates any change in temperature equivalent to 1/10 of 1 per cent of full scale. Immediate control action follows.

Feedwater Heater

D-24 THE SWARTWOUT COMPANY, 18511 Euclid Ave., Cleveland 12, Ohio, has announced a feedwater heater designed specifically for small manufacturing plants, institutions, public buildings, dairies, laundries, and wherever boiler capacities are 300 hp or less.

The unit utilizes exhaust steam to heat the water before it is delivered to the boiler. Made of fabricated steel, it has specially designed stainless steel trays which disperse feedwater in the form of thin curtains over a large area, so that the exhaust steam gives up its heat quickly and evenly. According to the manufacturer, a saving of 1 per cent in fuel will result from each 11 F increase in feedwater temperature by use of exhaust steam.

The unit is delivered complete, with all accessories ready to install.

◆

Reducing Valve

D-25 ATLAS VALVE CO., 282 South St., Newark 5, N. J., has announced a newly designed high pressure reducing valve which handles working pressures as

high as 6,000 psi. The new development, known as Type "E", is furnished with Stellite-faced main valve and Stellite-faced seat ring, which makes it resistant to corrosion. The body is of steel. Other internal metal parts are of hard chromium plated stainless steel. The valve is designed to handle water, oil, or air.

Complete information will be furnished by the manufacturer upon request.

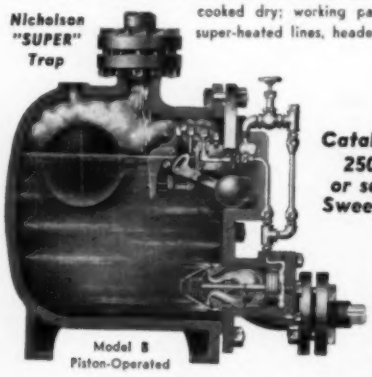
◆

Most Widely Used Way of Trapping

HEAVY SLUGS of CONDENSATE

Thousands of installations on steam purifiers attest to the enormous drainage capacity of this Nicholson trap. Piston-operated and with valve orifices up to 2" diameter, it discharges large volumes of water almost instantly. Won't leak even if cooked dry; working parts of stainless steel. Also for super-heated lines, headers, separators, etc.

Nicholson "SUPER" Trap



Model S Piston-Operated

Catalog 250 or see Sweet's

Model WD

NICHOLSON WEIGHT-OPERATED TRAPS — Three models for pressures to 200, 650 and 1500 lbs.; for steam, air, gasoline. Also feature large capacity and proof against leaking.

W. H. NICHOLSON & CO., 175 Oregon St., Wilkes-Barre, Pa.

Impact Wrench

D-26 THE MALL TOOL COMPANY, 7725 South Chicago Ave., Chicago 19, Ill., has introduced a new portable electric impact wrench which applies and removes screws, studs and nuts, and is suitable for nut running up to ½ inch bolt size. The model will also drill, tap, ream and extract broken capscrews or studs and drive wood augers, hole saws, and wire brushes. It is designed for one hand operation for all-around industrial jobs. The 11", 7 lb unit is adaptable for use in close quarters.

The tool is powered by a reversible, air-cooled universal motor for operation on 115 volt ac-dc current. The impact hammer is mounted on an anti-friction bearing that eliminates kick and twist in the hand. Housing is made of die cast aluminum alloy.

TECHNICAL BOOKS

Circuit Analysis of A-C Power Systems, Vol. II

By Edith Clarke

Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y.

6x9¼ inches—396 pages.

Price, $8.50.

"Circuit Analysis of A-C Power Systems", Volume Two, written by Edith Clarke, Professor of Electrical Engineering, The University of Texas, is one of a series written by General Electric authors for the advancement of engineering practice.

This volume presents methods for determining the performance of a-c power systems under normal and abnormal operating conditions. The electrical characteristics of insulated cables, various types of transformers and auto-transformers, synchronous machines and induction motors are determined, with special attention to the development of equivalent circuits for use in the component networks. As in Volume One, circuits are analyzed by means of components.

◆

Applied Nuclear Physics

By Ernest Pollard and William L. Davidson

Published By John Wiley & Sons, Inc., 440-4th Ave., New York 16, N. Y.

6 x 9 inches—352 pages.

Price, $5.00

The second edition of "Applied Nuclear Physics" is an interesting and concise explanation of nuclear physics and its progress since 1942. The book gives a clear picture of practically all phases of nuclear science including the basic facts of nuclear particles and radiations and methods of accelerating them, transmutation, natural and artificial radioactivity, isotopy, and nuclear fission. The authors seek to provide enough detail so that the reader can "apply the techniques of nuclear physics to research problems with some facility".

Selected references are supplied at the end of each chapter, and the appendixes tabulate many of the nuclear properties of isotopes. An appendix on elementary pile theory is a new addition. Also included is an additional chapter on nuclear chain reactions and a section on nuclear diffraction.

From the primitive, hand-operated drilling-machine of 1871 to the self-powered "coal popper" of today is a long step forward. Modern coals, too, show equal improvement over their predecessors. Photo shows modern "coal popper" in action, drilling blast holes into uncovered coal seam.

SOUTHERN takes the GUESSWORK out of your coal burning problems

Yes, Southern Coal Company ships a variety of modern, precision-sized and thoroughly washed coals from mines with great reserves. More important, which one will burn most efficiently and economically in your equipment? Answering this question is the chief mission of Southern's coal engineers.

Their method eliminates guesswork! A staff of trained engineers stands ready to **1** Make a scientific survey of your plant **2** Recommend the most logical coal for your equipment **3** Conduct actual burning tests **4** Chart final results.

Southern firmly believes this is the *only* real and logical approach to better coal utilization. If you agree with us and are looking for lower steam costs, get in touch with our nearest branch office—today.

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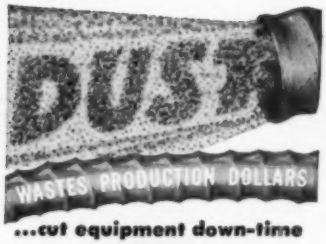
Sinclair Coal Company, Kansas City 6, Mo.—Western Representative
Boon-Strachan Coal Company, Ltd., Montreal—Canadian Representative



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Abrasive dust constantly wages war against the profitable, uninterrupted operation of grinders, buffers, polishers, and near-by machine-tools. It bites into bearing surfaces—and PROFITS. But it can be licked.

Efficient, light-weight, Spiratube chases, and captures dust . . . around corners, into pockets, hard-to-get-at places. Cushioned construction rides with the punch of high-velocity abrasive particles . . . lasts and lasts.

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NEWS
FOR SOUTHERN INDUSTRY

A.S.M.E. Spring Meeting—Atlanta

The National Spring Meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS will be held in ATLANTA, GEORGIA, on April 2 through April 5, 1951. Headquarters are at the Biltmore Hotel.

General Co-Chairmen of the meeting are: LESLIE F. ZSUFFA, Director of Public Relations, Georgia Institute of Technology, Atlanta, and CLAUDE L. HUEY, Southern Sales Engineer, Babcock & Wilcox Co., Atlanta.

Plants to be visited during this period are: ATLANTIC STEEL COMPANY; Textile Building, GEORGIA INSTITUTE OF TECHNOLOGY; SOUTHERN WOOD PRESERVING CO.; and the BUICK-OLDSMOBILE-PONTIAC ASSEMBLY DIV., GENERAL MOTORS CO.

J. CALVIN BROWN, National President of A.S.M.E., of Los Angeles, and STEPHEN D. MOXLEY, Vice President of Region No. 4, of Birmingham, will be in attendance.

The 1951 Region IV Administrative Committee Meeting will be held on Sunday, April 1, followed by the Student Branch Conference for Region IV on April 2, with both meetings being held at the Hotel Biltmore.

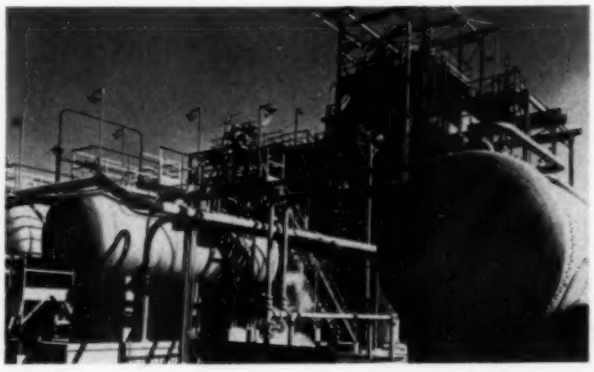
The Technical Program will consist of 18 sessions sponsored by the Power, Process Industries, Hydraulic, Materials Handling, Fuels, Heat Transfer, Textile and other Divisions and technical committees of the Society.

Some of the papers scheduled for presentation cover such subjects as "Evaluation of the Industrial Engineering Curriculum," "Placement of Engineering College Graduates," "Utilization of Wood Wastes," "Frozen Food Packaging," and others.

U. S. Rubber—Baton Rouge, Louisiana

The United States Rubber Company has purchased the Buna-N synthetic rubber plant of Esso Standard Oil Company in Baton Rouge, Louisiana, as a major step in the expansion of its facilities for the manufacture of chemicals, plastics and synthetic rubbers.

Plant will be operated by the Naugatuck chemical division of the rubber company which will continue to market Buna-N rubber under the trade name paracril.



Atlas—Houston

Mr. George L. Wirtz, President of the ATLAS MINERALS PRODUCTS COMPANY, Mertztown, Pennsylvania, has announced that NEWTON O. DUNCAN, JR., a recent graduate of Texas A & M College, has joined the Company and has been assigned to the HOUSTON office.

◆

New South Carolina Plant For Owens-Corning Fiberglas

Arrangements have been completed for building a new Fiberglas yarn manufacturing plant in ANDERSON, SOUTH CAROLINA, according to Harold Boeschenstein, president of OWENS-CORNING FIBERGLAS CORPORATION.

Production will begin about the middle of 1951 with an initial working force of approximately 200 employees.

FUTURE EVENTS
Of Engineering Interest

AMERICAN SOCIETY FOR TESTING MATERIALS, Sec'y, 1916 Race St., Philadelphia 3, Pa.
March 5-9, Spring Meeting and Committee Week, Cincinnati, Ohio.

INTERNATIONAL INDUSTRIAL EXPOSITION, Ed G. Lenzner, Gen. Mgr., 41 San Jacinto St., Houston 2, Texas.
March 11-17, Coliseum, Houston Texas.

AMERICAN SOCIETY OF TOOL ENGINEERS, Sec'y, 1666 Penobscot Bldg., Detroit 26, Mich.
March 15-17, 19th Annual Meeting New York, N. Y.

AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC., R. E. Byrd, Pres., Atlantic Steel Co., P. O. Box 1714, Atlanta, Georgia.
March 21-22, 16th Annual National Meeting, Hotel Atlanta-Biltmore, Atlanta, Georgia.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
April 2-5, Spring Meeting, Hotel Atlanta-Biltmore, Atlanta, Georgia.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
April 17-19, Process Industries Conference, Baltimore, Md.

NATIONAL MATERIALS HANDLING EXPOSITION, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
April 30-May 4, Fourth Annual Exposition, International Amphitheatre, Chicago, Ill.

NATIONAL ASSOCIATION OF POWER ENGINEERS, INC., A. F. Thompson, Director of Exhibits, Suite 1050, 176 West Adams St., Chicago 3, Ill.
Aug. 21-23, Golden Anniversary National Power Show, Hotel Plaza, San Antonio, Texas.

robbins & myers "J" hoists

carry weight anywhere...

widen markets for Howe Scale company

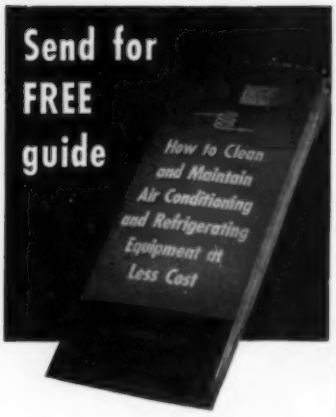
Here's a time and money-saving hoist that really gets around. The Howe Scale Co., Atlanta, Ga., uses this special truck, with an R&M "J" hoist, to convey twelve 500-lb. test weights to check and service industrial scales throughout the southeastern states. The driver merely connects a drop cord to nearest electrical outlet, uses standard push-button pendant control to operate hoist, loading or unloading two 500-lb. weights at a time. Operator effort is minimized. More customers are served per day. And Howe Scale now covers a wider-than-ever service area.

R&M "J" hoists are ideal for the job: rugged, simple, low on maintenance, long on performance. If you have a weight-lifting problem of any kind, an R&M hoist or crane installation—engineered to your job requirements will help conserve manpower, increase productivity, and pay a higher return on your total equipment investment. Your nearest R&M field engineer is always at *your service*. Write for Bulletin S31P.

TAKE IT UP WITH ROBBINS & MYERS INC

MOTORS HOISTS CRANES FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO



HOW are other plant engineers handling today's problem of maintaining efficiency of air conditioning equipment? What short-cuts are proving successful in conserving water — saving operation expenses through effective maintenance cleaning?

In this new booklet you will find the answers to those and such other problems as . . .

- Controlling Slime
- Removing Hard Water Scale
- Cleaning Water Lines
- Removing Rust

Then, too, there is valuable information on maintenance cleaning of such allied equipment as . . .

- Evaporative Condensers
- Ammonia Condensers
- Glass Filtering Units
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- Aluminum Plates and Screens

If you think you could use a copy of this booklet—and the number is F7383 — simply put your name and address on a penny post card and mail to Oakite Products, Inc., 23A Thames St., New York 6, N. Y.

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Southern Sales Staff Shifted by Acme Steel

Territorial and staff changes to meet industrial expansion in the South have been announced by MR. W. S. HUSS, southern division sales manager of ACME STEEL COMPANY.

WILLIAM G. POLLEY, sales engineer, has been assigned to the staff of Mr. Huss as area special representative. Mr. Polley, continuing at headquarters at 603 Stewart Avenue, S. W., ATLANTA, GEORGIA, will provide specialized services to customers throughout the South.

Creation of a new Atlanta sales district covering FLORIDA, GEORIGA, ALABAMA and TENNESSEE has been followed by the appointment of CLARENCE A. CARRELL as district manager. Mr. Carrell, who joined Acme Steel 30 years ago, has served as acting manager of the southern division.

G. R. "RED" EASLEY has been appointed district manager of a new sales territory consisting of VIRGINIA, NORTH CAROLINA and SOUTH CAROLINA. Mr. Easley, a specialist in the problems of the textile industry, has been with Acme Steel for 16 years. District headquarters will be located at Greenville, S. C.

JUDD B. FARR has been assigned to the South Carolina territory previously handled by Mr. Easley. JOHN J. JORGENSEN, has been transferred from area headquarters to the Chattanooga, Tennessee sales territory.

◆

Catalyst Plant—Louisiana

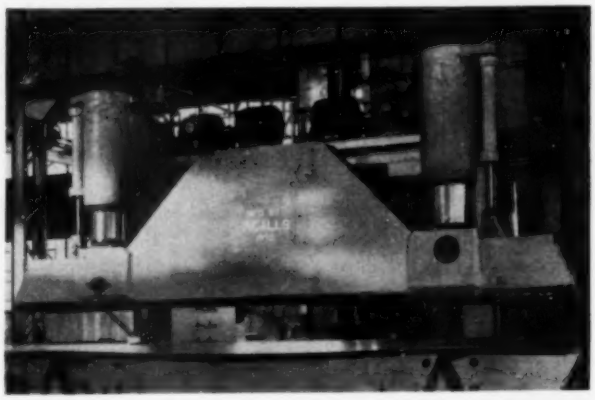
A new plant, embodying new processing techniques in the production of catalyst used in the preparation of high octane gasoline, will be constructed by THE RUST ENGINEERING CO., for the BAY CHEMICAL CO., WEEKS, LOUISIANA, a division of MORTON SALT CO.

◆

B. F. Goodrich—W. Va.

Production of man-made rubber began recently at the giant INSTITUTE, WEST VIRGINIA plant of B. F. GOODRICH CHEMICAL COMPANY. The plant has a rated capacity of 90,000 long tons of rubber a year, almost equal to one month's consumption in the United States.

The B. F. Goodrich division also is operating for the government a 60,000 ton unit at PORT NECHES, TEXAS, which is producing in excess of its rated capacity.



Huge Hydraulic Press for Ingalls Iron—Birmingham

The Ingalls Iron Works Company of Birmingham, Alabama, the nation's largest independent structural steel fabricator, has completed at its Birmingham Southside plant, several massive weldments for a large new hydraulic press.

This section of the press is readied for further processing. Housing section consists of two weldments weighing 29 tons each, including cylinders.

Press will be used in the company's Southside plant to expand production of large weldments and enlarge steel fabricating facilities.

A.S.T.E.—Annual Meeting

The annual meeting of the American Society of Tool Engineers opens in New York City, March 14.

Theme of the entire meeting will be mobilization of production know-how. The meeting will be in the form of an open forum to help develop the best ways for industry and the armed forces to work together in correlating available production techniques with military requirements. ROGER F. WAINDLE, General Manager, Industrial Products Division, Elgin National Watch Company and a Vice President and National Director of the ASTE will preside.

◆

Georgia Power Co. Pres.

HARLLEE BRANCH, JR., has been elected president of the GEORGIA POWER COMPANY succeeding C. B. McMANUS. Mr. McManus became chairman of the newly-created executive committee of the board, and a vice president of the company. Mr. McManus will continue as president of the SOUTHERN COMPANY.

As administrator of the Defense Power Administration of the Department of the Interior, Mr. McManus is spending all of his time in Washington in the interest of national defense, and the change has necessitated the relinquishing of his former administrative duties with the Georgia Power Company and the Southern Company.

In addition to Mr. McManus, the other members of the executive committee elected by the board are MR. MACDOUGALD, MR. BRANCH, E. A. YATES, chairman of the board of the Southern Company and vice president of the Georgia Power Company, MILLS B. LANE, president of the Citizens & Southern National Bank, and JOHN A. SIBLEY, chairman of the board of the Trust Company of Georgia.

◆

American Flexible Coupling—Southwest

Appointment of the H. H. KUMLER COMPANY, HOUSTON and TULSA, as representative in the states of TEXAS and OKLAHOMA, has been announced by the AMERICAN FLEXIBLE COUPLING COMPANY, Erie, Pa.

The Kumler Company was organized in 1946 as a manufacturers' representative in Tulsa, by H. H. Kumler. Mr. Kumler is a graduate of Ohio State University with a degree in petroleum engineering. He has been with the Farval Corporation and Cleveland Worm and Gear Company.

◆

Tide Water Power Elects Andrews

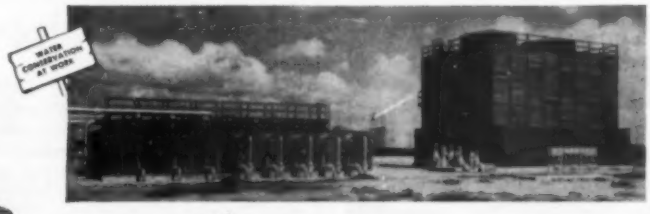
ROBERT P. ANDREWS of TIDE WATER POWER COMPANY, Wilmington, N. C., has been elected Vice-President of the company.

Andrews has been New Business Manager since 1949, and was Merchandise Manager prior to that. He has been handling all new customers and merchandise for the last three years.

◆

Northern Equipment Promotes William L. Hunter

WILLIAM L. HUNTER, formerly General Manager, has been named Vice-President and General Manager of the NORTHERN EQUIPMENT DIVISION, CONTINENTAL FOUNDRY & MACHINE COMPANY, Erie, Pennsylvania.



"That Pritchard Tower Is Sure Doin' A Job For Us" — Says Refinery Superintendent.

We got a tough assignment back in '49. Our customer needed a tower which would cool more than 4,000 gallons of recirculating water per minute from 105° down to 85° F., only 5° above the ambient wet bulb temperature. His entire process depended completely on 85° water—there could be *no* excuses! Could we do it?

We could, and we did. A few months later the Pritchard series "J" Induced Draft Cooling Tower with separate coil shed pictured above was put into operation.

Today, according to the plant superintendent, this tower is consistently equalling or exceeding the design performance in accordance with the test procedures outlined by the ASME, with the operating crew taking their own test readings.

Why don't you, too, find out about the advantages of using Pritchard Cooling Towers in your plant? Consult your nearby Pritchard representative for full information.

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Dept. No. 115 900 Grand Ave., Kansas City 6, Mo.

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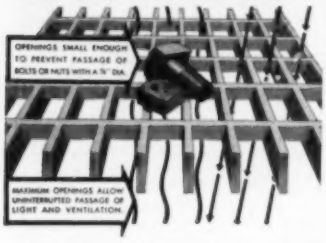
TRI-LOK RECTANGULAR OPEN STEEL FLOORING


OPENINGS SMALL ENOUGH TO PREVENT PASSAGE OF BOLTS OR NUTS WITH A ½" DIA.
MAXIMUM OPENINGS ALLOW UNINTERRUPTED PASSAGE OF LIGHT AND VENTILATION

Tri-Lok strength is obtained by truss action through twisted cross-bar, curved in opposite directions at each bearing-bar. Standard openings in Tri-Lok Rectangular Steel Flooring are 1" x 3 7/16"—other sizes can be supplied as required.

Diagonal, or Super-Safety U-type Flooring, and stair treads of all types, are available. Bulletin KE 1140 describes the construction features of Tri-Lok Open Steel Flooring.

The Tri-Lok Company is also equipped to furnish *riveted* and Tri-Forge *welded* open steel flooring. Tri-Lok grating can be furnished in a variety of metals, including aluminum alloy, stainless steel, etc.

DRAVO CORPORATION

National Distributor for the
Tri-Lok Company
Dravo Bldg., Pittsburgh 22, Pa.
Sales Representatives
in Principal Cities

DRAVO

UNEQUALLED

. . . FOR MOISTURE-PROOF SPLICES

...users who KNOW buy only the BEST

Ask for them by name...

OKONITE and MANSON tapes

S. T. Mackenzie Sales Manager B&W

Appointment of S. T. MACKENZIE, head of the Philadelphia office of THE BABCOCK & WILCOX COMPANY to the newly created post of SALES MANAGER was recently announced by W. T. McCullough, Jr., vice president of the company. Previously Mr. McCullough handled duties of sales manager as well as of vice president. Mr. Mackenzie, who will headquarter in New York, graduated from Lehigh University in 1924, joined Babcock & Wilcox in 1934 and had been in charge of the Philadelphia office since 1946.

Mr. R. W. Buntin will become district sales manager of the Philadelphia office to replace Mr. Mackenzie.

◆

American Air Filter Appoints Kane

THE AMERICAN AIR FILTER COMPANY, INC., LOUISVILLE, KENTUCKY has announced the appointment of JOHN M.KANE as Manager of the Dust Control Division. He joined the Company in 1933 after graduating from the University of Kentucky with a B. S. in Mechanical Engineering and was made Chief Engineer of the Dust Control Division in 1944.

◆

Dravo Appoints Black

Appointment of ROBERT C. BLACK as advertising manager of the Machinery Division of DRAVO CORPORATION, Pittsburgh, has been announced by WILLIAM H. COLLINS, the Corporation's Director of Advertising.

Dravo's Machinery Division includes the company's heating, ventilating, air conditioning, power plant, piping and heavy industrial equipment departments.

Mr. Black formerly was on the staff of the vice president of Westinghouse Electric Corporation and had served as advertising and sales promotion manager for the southeastern district of Westinghouse at ATLANTA, GA.

◆

Hutchinson Foundry & Steel To Handle Worthington Equipment

MR. J. P. O'SULLIVAN, President of THE HUTCHINSON FOUNDRY AND STEEL COMPANY, HUTCHINSON, KANSAS, has announced the signing of distributorship agreement to handle WORTHINGTON PUMP AND MACHINERY CORPORATION construction equipment, including mixers, placers, air tools, centrifugal pumps and suction and discharge hoses.

The company has been serving city, county and state highway departments, as well as general contractors in South Central Kansas area for the past 38 years.

CARL R. KLAVER is industrial sales manager for the company.

◆

Walter Geist, A-C President, Dies

WALTER GEIST, since May, 1942, president of ALLIS-CHALMERS MANUFACTURING COMPANY, Milwaukee, Wisconsin, died suddenly January 29 of a heart ailment. He was 56.

Geist left high school in 1909 to join Allis-Chalmers. After going to work, young Geist took evening and extension courses at the University of Wisconsin in Milwaukee.

It was while he was an engineer in charge of transmission in the milling department that Geist developed the multiple V-belt Texrope drive. This development was to bring Allis-Chalmers more than $30 million in direct sales in later years.

In early 1942, Mr. Geist was selected as executive vice-president and in May of that year he was elected president. During his terms as president, he saw company sales reach a high of more than $375 million and profits of more than $18 million annually. During the late war years, the company employment was approximately 40,000.

It was while he was president that the firm conducted its valiant and almost year long battle against communist leadership in its unions. He saw seven of the firm's plants closed down in 1946 by a strike which resulted in the exposing of the communist affiliations of the leaders of Local 248, UAW-CIO at the West Allis Works.

It was only last July that the firm successfully negotiated five year contracts with all except two of the fourteen unions with which the firm bargains.

Mr. Geist was a firm believer in what he liked to term the "Human Side of Business." Many programs which were examples of this philosophy were created during his presidency. One of the most outstanding of these projects was designed to rehabilitate problem drinkers among the firm's employees. In the two years since that program was inaugurated, nationwide industrial attention has been focused on this work.

Whitehead Metal Products Baltimore

T. M. BOHEN, president of WHITEHEAD METAL PRODUCTS COMPANY, INC., announced the removal of the Baltimore metal warehouse to enlarged and improved quarters at 4300 E. Monument Street, BALTIMORE, MARYLAND.

JOHN W. MARPLE will continue to direct activities as resident branch manager.

◆

Flexitallic—Md., Ga., La.

FLEXITALLIC GASKET CO., Camden, N. J., has added the followning new distributors to its field organization:

TATE ENGINEERING & SUPPLY CO., INC., Baltimore, Md., will serve MARYLAND and WASHINGTON, D. C.

SOUTHERN MARINE SUPPLY CO., INC., Savannah, Ga., will serve the marine industry within the limits of SAVANNAH.

EAGLE ASBESTOS & PACKING CO., New Orleans, La., will serve both industrial and marine industries in eastern LOUISIANA and southern MISSISSIPPI.

Fafnir Bearing Co.— Charlotte, N. C.

THE FAFNIR BEARING COMPANY, New Britain, Conn., has moved its Charlotte office and warehouse to larger, more modern quarters at 119 West 29th St., Charlotte 6, N. C.

◆

Howe Scale Co. Opens Houston Office

THE HOWE SCALE COMPANY, Rutland, Vt., has opened a branch office at 2215 McKinney Ave., HOUSTON, TEXAS, under the management of HENRY K. LEONARD. The new branch has complete sales, service, and warehouse facilities.

◆

Burgess-Manning Dallas Division

BURGESS-MANNING COMPANY, manufacturers of exhaust and air line snubbers and noise abating products, has opened a new division in DALLAS, TEXAS, with R. L. LEADBETTER, V. P. in charge. S. G. PADDOCK is Manager of Sales in the Dallas office, and A. P. GALLAGHER is Engineering Assistant.

Port of Houston Hits New High

Total tonnage handled by the PORT OF HOUSTON hit a new, all-time high of 41,995,143 tons during 1950, an increase of 11.8 per cent.

Port Director W. F. HEAVEY said he is "certain that Houston will retain its rank as nation's second port because there are no indications that other major ports such as Philadelphia and Baltimore had signal gains during the year." Houston has been second only to New York in total tonnage since 1948.

◆

Wheelco—D. C., Va., Md

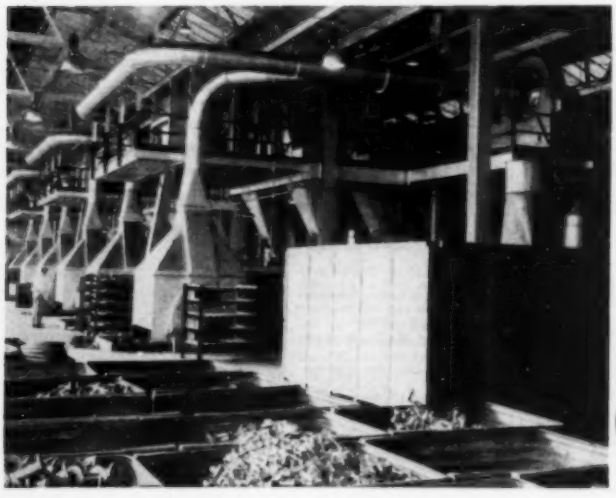
WHEELCO INSTRUMENTS COMPANY, Chicago, has announced the appointment of ANSELL & GODA as their District Agency for the territory which includes the DISTRICT OF COLUMBIA, VIRGINIA and part of MARYLAND. The agency has opened a new office at 3432 Connecticut Avenue N. W. Washington 8, D. C.

The former agents in this territory, THE PHIPPS & BIRD COMPANY, will continue to serve as an authorized resale agency of the Wheelco Instruments Company.

1st in Industrial Good Housekeeping...

EFFICIENT DUST CONTROL

Casting shake-out booths in a leading farm implement manufacturer's plant.



● Well engineered and effective dust control is necessary to maintain cleanliness and efficient operation.

The photo shows a foundry shake-out room in which dust is effectively suppressed and removed at the source by virtue of collection both above and below the shake-out.

There is no simple "formula" for the selection of dust control equipment. For guaranteed results — just one contract, one responsibility for a complete, ready-to-operate system, consult experts. If you need a new system . . . or more capacity in an existing one, call on Liberty Engineering.

Liberty ENGINEERING AND MANUFACTURING CO.
1454 South 15th St.
Louisville 1, Ky.
A Division of The Kirk & Blum Mfg. Co.

International Industrial Exposition Houston, Texas—March 11-17

The display of tools, machinery and materials for diversified industrial uses at the INTERNATIONAL INDUSTRIAL EXPOSITION to be held in HOUSTON, TEXAS, from March 11 through 17th is of particular importance at this time when the vast rearmament program is beginning to get under way.

Four Shows in One

The International Industrial Exposition is actually "four shows in one" with equipment and materials being exhibited for use in oil fields, chemical industries, refining and general industrial. Methods and application will be stressed and much of the equipment on display will be in operation to show its performance under field and plant conditions.

Engineering Exhibit

The Annual Engineering Show of the University of Houston will be given at the Exposition. These exhibits will include a gas-lift demonstration; a test engine for octane number rating, which determines the quality and performance of fuels for gasoline engines; stress analysis; and typical industrial plant processing layouts.

Mechanical, petroleum, electrical, civil, architectural and chemical engineering departments of the University of Houston will be represented. Dean M. L. Ray is in charge of the School of Engineering and C. P. Houston is Assistant Dean. Dr. W. W. Kemmerer is President of the University.

Industrial Films

Sound films of technical and industrial subjects will be shown on a definite scheduled program. Films will be supplied by exhibitors and will show manufacturing processes, application of equipment, plant operation, materials handling methods, etc. Representatives of companies whose films are being shown will be present for post showing technical discussions.

The International Industrial Exposition will not be open to the public. Complimentary tickets can be obtained by Southern and Southwestern industrial plant men by writing Mr. E. G. Lenzner, General Manager, International Industrial Exposition, 41 San Jacinto St., Houston 2, Texas.

◆

Black & Decker Branch At Hampstead, Md.

THE BLACK & DECKER MFG. CO., Towson, Maryland has purchased approximately 180 acres at HAMPSTEAD, MARYLAND. A branch plant to provide additional facilities for the manufacture of portable electric tools will be erected on the site.

◆

N. P. A.—Southeast

Establishment of six new branch offices of the U. S. Department of Commerce in the Southeast to assist in administration of the NATIONAL PRODUCTION AUTHORITY program in their respective areas has been announced.

The new offices are located in CHARLOTTE, CHATTANOOGA, BIRMINGHAM, TAMPA, COLUMBIA, S. C., and JACKSON, MISS.

◆

Rust Engineering—South

THE RUST ENGINEERING CO., and subsidiaries, of Pittsburgh, and BIRMINGHAM, ALA., reported that during 1950 its operations in the South represented an important part of the firm's activities.

Projects, both completed and under contract, include work on a wide variety of facilities for producing such products as paper, chemicals, cement, catalyst, wooden boxes, sugar and steel.

Paper mill work was continued on large expansions for West Virginia Pulp and Paper Co. at Covington, Va.; for Crossett Paper Mills at Crossett, Ark.; and for Hollingsworth and Whitney Co. at Mobile, Ala.

In the chemicals field, work was continued on the major expansion program of American Viscose Corp. at Front Royal, Va. A subsidiary, The Rust Process Design Co., will handle process design of a new plant at Weeks, La., to produce catalyst for the Bay Chemical Co., a division of Morton Salt Co. Rust Engineering will handle construction of the plant.

Work on vital national projects located in the South involves special work for the Army Chemical Corps; construction of laboratory buildings for the N A C A at Langley Aeronautical Laboratory, near Hampton, Va., at a cost of over $3,813,679; and installation and testing of U. S. Air Force and German equipment for high altitude engine test facilities at the Arnold Engineering Development Center, Tullahoma, Tenn.

Rust continued work on a contract with Houston, Texas, for enlargement of its North Side Sewage Treatment plant and sludge disposal facility; and substantially completed a new 4,000,000-gallon-per-day filter plant addition for the City of Decatur, Ala.

Rehabilitation of the fire-destroyed plant of the Nash-Christian Foundry Supply Co., at Birmingham, Ala., was completed with the least possible delay in production schedules.

Another fire-razed facility was replaced at Brewton, Ala., for the T. R. Miller Mill Company. The new facility, planned to be one of the nation's most modern plants for the production of wire-bound boxes, was completed at a cost of over $750,000.

Hi-Test
KEWANEE
FOR POWER and PROCESS STEAM
6 Sizes for 50 to 150 H.P., 125 and 150 lbs. W.P. . . . a quick steaming, all-welded portable type with firebox for refractory lining. A fuel saver.
80 Years Boilermakers
WRITE Dept. 49-P3 for 6" scale with pipe diameter markings.
KEWANEE BOILER CORPORATION
KEWANEE, ILLINOIS

USE MERCOID CONTROLS
FOR OIL BURNERS, STOKERS, GAS BURNERS, REFRIGERATION, AIR CONDITIONING AND VARIOUS INDUSTRIAL APPLICATIONS
MERCOID SWITCH 9-81
IT'S THE MERCURY SWITCH THAT DISTINGUISHES Mercoid FROM THE AVERAGE LINE OF CONTROLS
MERCOID SWITCH
INSURING GREATER SAFETY, BETTER PERFORMANCE AND LONGER CONTROL LIFE
CATALOG SENT UPON REQUEST

THE MERCOID CORPORATION
4201 Belmont Avenue
Chicago 41, Illinois

STOP BASEMENT WALL LEAKS

Smooth-On No. 7 Iron Cement stops your basement wall and floor leaks. You can apply Smooth-On No. 7 with a trowel or stiff brush, to cracks, holes, porous spots or seams in concrete, brick, stone walls or floors. This effective Smooth-On Cement will stay in place, because it expands slightly as it sets. You can also use Smooth-On No. 7 to stop leaks in tanks, cisterns, pools, troughs, fountains, etc. Use it too, to seal openings where piping passes through walls. Sold in 1, 5, 20, and 100 lb. sizes.

FREE Repair Handbook, 40 pages, packed with helpful suggestions for repairs to equipment and piping, in the shop, around the home and car. Also ask for leaflet describing the uses of Smooth-On No. 7. Write today.

SMOOTH-ON MFG. CO., Dept. 35
570 Communipaw Ave., Jersey City 4, N. J.

Do it with **SMOOTH-ON**
NO. 7 IRON CEMENT

SPHERICAL TANKS ON TUBULAR TOWERS

The COLE Spherical Tank on Tubular Tower is a pioneer in its field. We designed and erected the first tank of this character built.

This design provides an attractive and serviceable unit—economical to maintain, efficient in service and pleasing in appearance.

Write for special booklet on these modern welded Spherical Tanks which provide gravity water pressure, and for copy of latest COLE catalog—"Tank Talk."

R. D. COLE MFG. CO.
NEWNAN, GA. Established 1854

CATALOGS AND BULLETINS

These free and helpful booklets are available for the asking.

Circle numbers desired on the page 17 service coupon post card.

B-10 INDUSTRIAL WATER CONDITIONING—Brochure, 12 pages—"Water Patrol for Profit Control" discusses control of scale, corrosion, and algae in relation to profits of industrial plants. Colored charts and illustrations accompany non-technical explanation.—AQUATROL INC., P. O. Box 12233, Houston, Texas.

B-11 BARREL CART—Catalog 012, 4 pages—Describes drum cart and drum for moving, pouring, and mixing liquid or powder. Discusses safety features; lists prices. Illustrated with photographs.—HODGSON ENGINEERING & MANUFACTURING CO., 7th and Rockford, Tulsa, Okla.

B-12 ARC WELDERS—Bulletin, 2 pages—Illustrates and describes arc welders for sheet metal production and repair. Includes table of power requirements, dimensions, shipping weight, and photographs of models available. — LARKIN LECTRO PRODUCTS CO., Pine Bluff, Ark.

B-13 GAS BURNERS—Bulletin, 4 pages—"Luminous Flame Draft Type Burners for L. P. G. & Natural Gas", designed and engineered for efficient operation in industrial boilers, are illustrated and described, with tables of dimensions and price list.—FAUCHER GAS BURNER CO., P. O. Box 973, S.S., Fort Worth 9, Texas.

B-14 COMPRESSERS—Bulletin 726-5, 26 pages—Horizontal duplex motor-driven compressors with anti-friction roller bearings throughout are described. Illustrations include cross-sectional diagrams, photographs of equipment and parts, and installation.—CHICAGO PNEUMATIC TOOL COMPANY, 6 East 44th St., New York 17, N. Y.

B-15 MECHANICAL SEALS—Catalog, 14 pages—"Mechanical Seals for Rotary Shafts" are discussed, including construction, service, sizes, typical applications, and other features. Illustrated with line drawings, diagrams, and photographs.—THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

B-16 CHAINS AND SPROCKETS—Catalog No. A418—Covers complete line of chains and sprockets for both new and replacement service on elevating and conveying equipment, and for drives. Gives information to simplify selection.—THE JEFFREY MANUFACTURING COMPANY, 898 North 4th St., Columbus 16, Ohio.

B-17 RINGS AND PACKINGS—Catalogs, two 8-pages, one 12-page—Piston rings, metallic rod packing, and Bakelite products are listed. Uses and instructions for ordering are included. Illustrated with drawings of typical ring installations.—DOUBLE SEAL RING COMPANY, P. O. Box 550, Fort Worth, Texas.

B-18 STORAGE BATTERIES—Catalog—"Ironclad Batteries for Motive Power Service" describes performance and utility of storage batteries for users of materials handling and haulage vehicles. Data pages (8½ x 11 loose leaf) list specifications of batteries, accessories, and miscellaneous parts.—THE ELECTRIC STORAGE BATTERY COMPANY, 1945 Allegheny Ave., Philadelphia 32, Pa.

B-19 INDUSTRIAL PUMPS — Bulletins S-204 and Q-50—Illustrate and describe Screw and Rotex Pumps, recent additions to the company's line of centrifugal and reciprocating pumps.—WARREN STEAM PUMP COMPANY, INC., Warren, Mass.

B-20 PALLET TRUCK—"An Engineering Achievement", 18 pages—Shows details of new Model "W" electric pallet truck engineered to handle pallet-loads weighing up to 4,000 pounds. Operational data and applications are included.—TOWMOTOR CORPORATION, Attn: Literature Dept., 1226 East 152nd St., Cleveland 10, Ohio.

B-21 MATERIALS HANDLING—Bulletin No. 105, 4 pages—Describes line of cranes, transfer bridges, and tramrail systems for use in textile mills, rubber plants, food processing, foundries, wire mills, paper mills, and other industries. Illustrated with installation photographs and parts details.—THE PORKER CORPORATION, 2044 Random Road, Cleveland 6, Ohio.

B-22 FORK TRUCKS—Bulletin 1324, 8 pages—Covers design and construction features of fork trucks in 3000 and 4000 pounds capacity. Illustrates trucks, components, and attachments. Photographs show the trucks working in 8 different industries.—BAKER INDUSTRIAL TRUCK DIVISION, THE BAKER-RAULANG COMPANY, 1250 West 80th St., Cleveland 2, Ohio.

B-23 VALVES AND FITTINGS—Catalog 50V, 112 pages—Entire line of bronze and iron body valves is described. Photographs, dimensional diagrams, price, weight, sizes and dimensions are included, with engineering data and description of accessories. — STOCKHAM VALVES AND FITTINGS, P. O. Box 2592, Birmingham 2, Ala.

B-24 TACHOMETERS — Bulletin 31, 16 pages—Describes and illustrates Frahm Resonant Reed Tachometers which require no contact with moving parts. Ranges and other information for ordering are given, including aids for proper selection and applications.—JAMES G. BIDDLE CO., 1316 Arch St., Philadelphia 7, Pa.

B-25 SPRAY NOZZLES—Bulletin 6A-SP, 8 pages—Recooling spray nozzle systems for use in plants which operate condensers or use large quantities of water for cooling, are pictured and described. Atmospheric conditions and operating pressures are discussed.—SCHUTTE & KOERTING COMPANY, Dept. J-D, Cornwells Heights, Bucks County, Pa.

B-26 INDUSTRIAL INSTRUMENTS — Bulletin 25-26, 20 pages—Covers Megger Ground Testing Instruments for measuring resistance of earth to ground connections and for earth resistivity. Includes aids to selection; application; typical tests; drawings, and illustrations.—JAMES G. BIDDLE CO., 1316 Arch St., Philadelphia 7, Pa.

B-27 TURBINE-GENERATORS — Bulletin H-18, 40 pages—Covers turbine-generators, 500 kw and above,. Installations, both utility and industrial, are pictured and described. Discusses generator and exciter cooling methods. Dimensions and weights of standard units are tabulated for easy reference.—ELLIOTT COMPANY, Jeannette, Pa.

B-28 STEAM SPECIALTIES—Catalog, 33 pages—Describes steam and air traps; pressure reducing valves; pump governors; pressure regulators; boiler feed controls, and temperature regulators. Includes data for sizing this equipment—trap capacity tables, reducing selection charts, etc.—THE C. E. SQUIRES COMPANY, 18502 Syracuse Ave., Cleveland 10, Ohio.

B-29 MAINTENANCE CHECKING CHART — Folder, 6 pages — Lists common building maintenance problems and recommends solutions. Products and processes for maintenance of floors, roofs, interior and exterior walls, waterproofing, special paints, etc., are included.—UNITED LABORATORIES, INC., 16801 Euclid Ave., Cleveland 12, Ohio.

B-30 CHEMICAL FEEDER—Bulletin 35-G5, 8 pages—A small weighing feeder for dry chemicals is described and illustrated. Line drawings show five typical installations. Operation is explained. — OMEGA MACHINE CO., Providence 1, R. I.

B-31 CAR SHAKER—Bulletin 07B7221A 6 pages—Describes car shaker for unloading granular material from hopper-bottom gondola cars. Construction features and specifications are given, with suggested applications in power houses, steel mills, chemical plants, paper mills, and other industrial plants.—ALLIS-CHALMERS MANUFACTURING CO., 954 S. 70th St., Milwaukee, Wis.

B-32 POWER TABLE—Bulletin No. 85-A, 12 pages—Describes new Multi-Drive power table for rotary sheet metal work, with various types of rolls used for the different rotary machine operations. Illustrated.—NIAGARA MACHINE & TOOL WORKS, 637-697 Northland Ave., Buffalo 11, N. Y.

B-33 BALL JOINTS—Catalog No. 215, 16 pages—Describes flexible ball joints for use in piping for power, process, heating, chemical, or hydraulic service. Illustrated with photographs of equipment and specific installations.—BARCO MANUFACTURING COMPANY, 1801 W. Winnemac Ave., Chicago 40, Ill.

B-34 INDUCTION MOTORS — Bulletin 1215, 4 pages—Illustrates and describes new totally enclosed, non-ventilated, squirrel cage, induction motors—7½ hp, 1800 rpm; and 5 hp, 1200 rpm, designed for service where dirt, dust, lint, metal turnings and sand are prevalent.—FAIRBANKS, MORSE & CO., 600 South Michigan Ave., Chicago 5, Ill.

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Business Card
for Salesmen
creates the first impression in the mind of the buyer—the impression of prestige and quality which frequently requires years of service and salesmanship to build.
A sample tab of perfect business cards are yours for the asking
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COOLING TOWERS

Water Cooling Towers of Induced, Forced and Natural Draft Types, specially designed for individual requirements. Mechanical Draft Cooling Towers have interior construction of redwood, with the outside casing of wood, steel, transite or masonry to harmonize with building construction. All C. H. Wheeler Water Cooling Towers are guaranteed to withstand hurricane winds up to 100 miles per hour. In addition, water cooling performance and efficient operation with 0.2% water drift loss are also guaranteed. Send for Cat. No. 145.

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REPRESENTATIVES IN MOST PRINCIPAL CITIES

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STEAM CONDENSERS · WATER COOLING TOWERS
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CHARTS

A HANDY REFERENCE BOOK
for Industrial Executives and Engineers

"Charts" gives quick solutions for everyday problems. If you are an operating executive, "Charts" will help you check readily engineering estimates, depreciation, interest, etc. If you are an engineer, "Charts" will help you quickly arrive at estimates without detailed calculation. "Charts" is a handsome, sturdily bound volume of 7 charts which you will use and value for years to come.

You may obtain a copy of this useful volume with your new or renewal 3-year subscription to SOUTHERN POWER AND INDUSTRY FOR $4.00.

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Big Tannery Cools Remarkable Storage with FRICK Refrigeration

W. D. Byron & Sons of Maryland have operated a well known tannery at Williamsport since 1897.

The hide storage room, measuring 96 by 46 ft., is now air conditioned by a special Frick system of the central-station type. Temperatures between 31 and 33 degrees F., and relative humidities of 85 to 90 per cent, are constantly maintained. (In a room that cold, such a high moisture content is most unusual.) Shrinkage losses are thus prevented, and the 600 tons of hides are kept in first-class condition. H. G. Burrill & Associates, Baltimore, consulting engineers.

Frick air conditioning, refrigerating, ice-making or quick-freezing systems can likely increase profits in YOUR business. Let us submit estimates: write, wire, phone or visit

DEPENDABLE REFRIGERATION SINCE 1852
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Two Frick Ammonia Compressors at the Byron Tannery, Williamsport, Md.

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"For Sale," Agents Wanted, and all other advertisements using bold face type or otherwise displayed, $6.00 per column inch per insertion.

Rates for larger spaces furnished on application

WITHOUT DISPLAY

"Position Wanted" advertisements, 5 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(When replies are to be received in our care allow eight words for the box address.)

For Men Looking for a SALES FUTURE

Opportunities open for sales representatives with a large national manufacturer of power plant feedwater treatment and allied chemical lines for industrial plants. Established territories open. Mechanical or Chemical Engineering degree from accredited college or university required. Under 35 years of age, three years' experience in sales, engineering, production or related fields. Write fully, giving business history and salary requirements. All replies confidential. Write Box 163, c/o SOUTHERN POWER & INDUSTRY, 806 Peachtree St., N.E., Atlanta 5, Ga.

WANTED—PLANT ENGINEER

For expanding, progressive textile manufacturing concern—excellent opportunity for man with plant experience, initiative and ability to supervise. College background and finishing plant experience desirable. Must be thoroughly familiar with operation of steam boilers and water treating plants. In reply give full work experience, educational background, personal data and availability for interviews. All replies kept confidential. Write Box 165, c/o SOUTHERN POWER & INDUSTRY, 806 Peachtree St., N.E., Atlanta 5, Ga.

PORTABLE CRANE TRUCK

Electric powered
Type C-4—Elwell Parker
12'—19'—telescoping boom
Cap'y: 3000 lb. at 7' radius
Very slightly used. Guaranteed perfect operating condition

Call your nearest Elwell Parker Agent, or, George J. McLernon, 209 Hubbard, San Antonio, Tex.

EXCELLENT POWER UNITS

2—125 KVA Westinghouse AC generators, 110 Volts, 277 RPM. Powered by 2 Bruce MacBeth gas/gasoline engines. For immediate sale from Dallas plant changing products.

A A A IRON & METAL CO.
Canton and Hawkins Sts. Dallas, Texas

POSITION WANTED

ENGINEER—With 22 years operating experience wants position in South or Southwest. Plant supervising preferred. Write Box 166, c/o SOUTHERN POWER & INDUSTRY, 806 Peachtree St., N.W., Atlanta 5, Ga.

FOR MEN LOOKING FOR A SALES FUTURE

Opportunities open for sales representatives with a large national manufacturer of power plant feedwater treatment and allied chemical lines for industrial plants. Established territories open. Mechanical or Chemical Engineering degree from accredited college or university required. Under 35 years of age, three years' experience in sales, engineering, production or related fields. Write fully, giving business history and salary requirements. All replies confidential.

WRITE BOX 162

c/o SOUTHERN POWER & INDUSTRY, 806 Peachtree St., N.E., Atlanta 5, Ga.

YOUR ADVERTISEMENT ON THIS PAGE

HAVE you some equipment, new or second hand, which you wish to dispose of? Do you desire a good man to fill a vacancy in your plant? Do you desire a position? Do you desire your business or professional card placed before the power, industrial and refrigeration fields?

Why not try an advertisement on this page of SOUTHERN POWER & INDUSTRY with its 15,500 copies per month? SOUTHERN POWER & INDUSTRY reaches the active executives and managers, superintendents, heads of departments and engineers,—the men directly in charge of plant process, the men who buy or dictate the buying of machinery, equipment and supplies.

Advertising on this page produces results at small cost. Note the rates above and tell us what you wish to advertise.

SOUTHERN POWER & INDUSTRY

806 PEACHTREE ST., N.E. **ATLANTA 5, GEORGIA**

POSITIVE! EFFICIENT! SAFER!

VALVE CONTROL AT LOWEST COST!

Babbitt
—Adjustable—
SPROCKET RIM
with Chain Guide

INSTALLED, AND OPERATING, IN ONLY A FEW MINUTES

● Here's easy, convenient, instant control of overhead, out-of-reach valves — right from the floor! No expensive apparatus! No switches! Nothing to break down when most needed! BABBITT Adjustable Sprocket Rim with Chain Guide, with only four simple parts, gives you positive efficient valve control at lowest cost!

● Prevents accidents, prevents waste, provides efficient control, and saves money. A range of 10 ADJUSTABLE sizes fits all valve wheels, with rising or non-rising stems, from 2 to 30 inches in diameter.

Jenkins Brothers, Atlanta, has complete stock. Other distributors in principal cities. Or send for Catalog Folder SP-2.

BABBITT STEAM SPECIALTY CO.
1 Babbitt Square
NEW BEDFORD, MASSACHUSETTS

The HEART of the START is a
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A-C MOTOR-STARTING CAPACITOR

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ADVERTISER'S INDEX

A

Advertising Council, Inc. ..... *
Air Preheater Corp. ..... *
Allen-Bradley Co. ..... *
Allis-Chalmers Mfg. Co. ..... Second Cover & 39
Aluminum Co. of America 8
American Blower Corp. ..... *
American Coal Burner Co. 125
American Engineering Co. ..... *
American Monorail Co. ..... *
American Pulverizer Co. ..... *
Anaconda Wire Cable Co. ..... *
Anderson Co., V. D. 123
Armstrong Machine Works 32
Atlantic Steel Company 83
Atlas Valve Co. ..... *

B

Babbitt Steam Specialty Co. 121
Babcock & Wilcox (Boilers) 21
Babcock & Wilcox (Refractories) ..... *
Bailey Meter Co. ..... *
Bay State Abrasive Products Co. ..... *
Beaumont Birch Co. ..... *
Belco Industrial Equip. Div. 12
Belmont Packing & Rubber Co. 100
Biddle Co., James G. ..... *
Bigelow-Liptak Corp. 22
Bird-Archer Co. ..... *
Borden Metal Products Co. ..... *
Buffalo Forge Co. 31
Bunting Brass & Bronze Co. ..... *
Bussman Mfg. Co. ..... *
Byron Jackson Co. ..... *

C

Carolina Refractories Co. 116
Chapman Valve Mfg. Co. 46
Chicago Bridge & Iron Co. 27
Chicago Heater Co. ..... *
Clarage Fan Co. 45
Classified Ads 120
Clever Brooks Co. ..... *
Cochrane Corporation 106
Cole Mfg. Co., R. D. 117
Columbia Steel Co. 19
Combustion Engr. Superheater Inc. ..... *
Continental Gin Co. 95
Cooper-Bessemer Corp. ..... *
Coppus Engineering Corp. 4
Crane Company 48

D

Dart Mfg. Co., E. M. 99
Davis Regulator Co. ..... *
DeLaval Steam Turbine Co. 37
Detroit Stoker Co. 29
Diamond Power Specialty Corp. ..... *
Dixie Mfg. Co. 104
Dowell, Inc. ..... Back Cover
Dravo Corp. 114

E

Eagle-Picher Co. ..... *
Elliott Co. ..... *
Emerson Elec. Mfg. Co. ..... *
Engineer Co. 9
Erie City Iron Works 43
Everlasting Valve Co. 101

F

Fairbanks, Morse & Co. 91
Finnigan, J. J. Co., Inc. 123
Fisher Governor Co. 33
Flexible Steel Lacing Co. ..... *
Flexible Tubing Corp. 110
Flour Corp., Ltd. 89
Foster Wheeler Corp. ..... 10 & 11
Frick Company 119

G

Garlock Packing Co. 124
General Coal Co. ..... *
General Electric Co. ..... 20, 35 & 36
Graver Water Conditioning Co. ..... *
Grinnell Co. ..... *
Gulf Oil Corp. 41

H

Hagan Corp. 97
Hajoca Corp. 121

I

Industrial Electronics Corp. 121
Infilco, Inc. ..... *
Ingersoll-Rand Co. ..... *
Iron Fireman Mfg. Co. 40

J

Jeffrey Mfg. Co. ..... *
Jenkins Bros. ..... Third Cover
Jerguson Gage & Valve Co. 102
Johns-Manville, Inc. ..... *

K

Kennedy Valve Mfg. Co. 105
Kewanee Boiler Corp. 116
Kieley & Muller ..... *
Kirk & Blum Mfg. Co. 115

L

Leslie Co. 123
Liberty Engineering & Mfg. Co. 115
Link-Belt Co. 34
LUBRIPLATE DIVISION
Fiske Bros. Refining Co. ..... *

M

Manning, Maxwell & Moore, Inc. ..... *
Manzel, Inc. ..... *
Mason-Neilan Regulator Co. ..... *
Mercoid Corp. 117

N

National Airoil Burner Co. ..... *
National Aluminate Corp. 1
National Tube Co. 19
National Valve & Mfg. Co. 26
Niagara Blower Co. 107
Nicholson & Co., W. H. 108
Northern Equipment Division, Continental Foundry & Machine Co. ... *

O

Oakite Products, Inc. 112
Okonite Co. 114

P

Pacific Coast Distributors 19
Pacific Pumps, Inc. 25
Permutit Co. ..... *
Pittsburgh-Corning Corp. 103
Pittsburgh Piping & Equipment Co. ..... *
Plymouth Cordage Co. ..... *
Powell Co., Wm. 23
Powers Regulator Co. 92
Prat-Daniel Corp. 88
Preferred Utilities Mfg. Corp. 79
Pritchard Co., J. F. 113
%Proportioneers, Inc.% ..... *

R

Raybestos-Manhattan, Inc. Packing Division 30
Republic Flow Meter Co. ..... *
Republic Rubber Division (Lee Rubber & Tire Corp.) ..... *
Riley Stoker Corp. ..... 14 & 15
Robbins & Myers, Inc. 111

S

Sarco Co., Inc. 42
Sinclair Refining Co. 7
Smith Corp., Winfield H. ..... *
Smooth-on Mfg. Co. 117
Southern Coal Co., Inc. 109
Southern Natural Gas Co. ..... *
Southern Railway System ..... *
Sprague Electric Co. 121
Springfield Boiler Co. 13
Standard Oil Co., Inc. ..... *
Sterling Electric Motors Inc. ..... *
Subox, Inc. ..... *
Superior Combustion Industries, Inc. 77
Swartwout Co., The ..... *

T

Taylor Forge & Pipe Works ..... *
Terry Steam Turbine Co., The 44
Texas Co. 2
Thermix Corp. 88
Tri-Lok Co. 114

U

U. S. Hoffman Mchy. Corp. ..... *
United States Steel Export Co. 19
U. S. Treasury ..... *

V

Vulcan Soot Blower Div. Continental Foundry & Machine Co. 45

W

Wagner Electric Co. ..... *
Walworth Co. 24
Want Ads 120
Warren Steam Pump Co., Inc. ..... *
Western Precipitation Corp. 98
Westinghouse Electric Corp. (Apparatus Div.) ..... *
Westinghouse Electric Corp. (Elevator Div.) 87
Wheeler Mfg. Co., C. H. 119
Wickes Boiler Co. ..... *
Wiegand Co., Edwin L. ..... *
Wiggins Co., John B. 118
Worthington Pump & Machinery Corp. .. 28

Y

Yarnall-Waring Co. 81

Z

Ziuk Co., John 85

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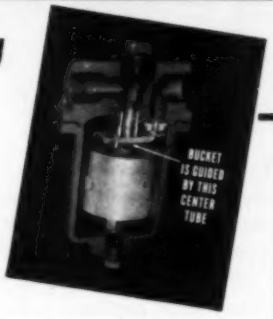

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FYR-FEEDER

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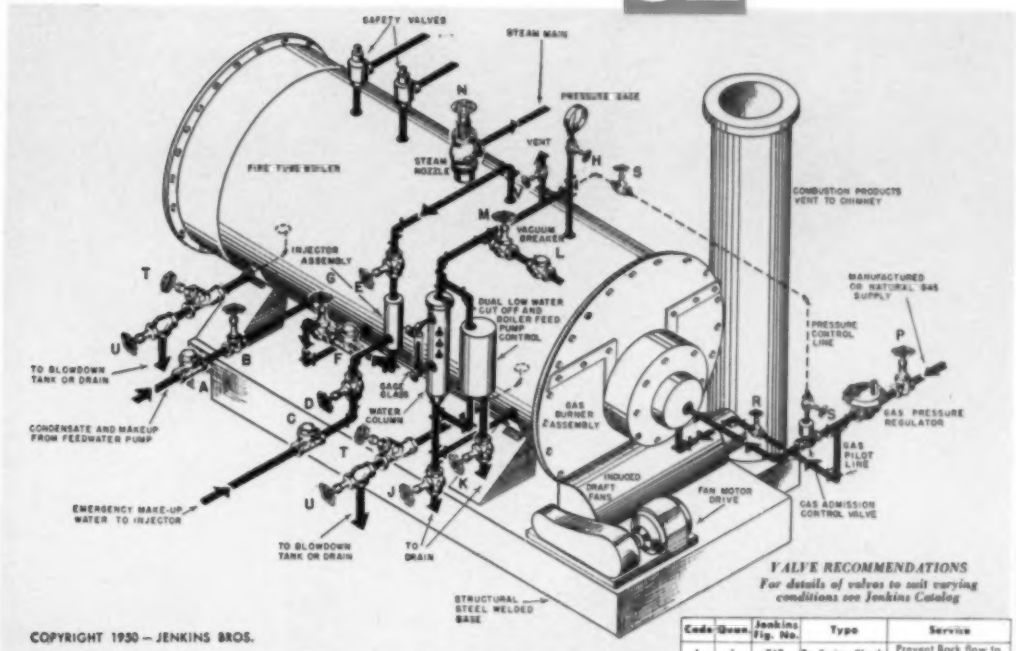

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VALVE RECOMMENDATIONS
For details of valves to suit varying conditions see Jenkins Catalog

Code	Quan.	Jenkins Fig. No.	Type	Service
A	1	763	Br. Swing Check	Prevent Back flow to Boiler Feed Pump
B	1	49	Br. Gate	Feedwater Shutoff
C	1	762	Br. Swing Check	Prevent Back flow to Emergency Make-up
D	1	950	Br. Globe	Emergency Make-up Manual Control
E	1	956	Br. Globe	Control Steam Flow to Injector
F	1	762	Br. Swing Check	Injector Mixture to Boiler
G	1	950	Br. Globe	Emergency Make-up Admission to Boiler
H	1	741-G	Br. Needle	Pressure Gage Control
J	1	956	Br. Globe	Water Column Blowdown
K	1	956	Br. Globe	Blowdown Control
L	1	756	Br. Lift Check	Vacuum Breaker Air Admission
M	1	950	Br. Globe	Vacuum Breaker Shutoff
N	1	925	I.B.B.M. Angle	Steam Nozzle discharge
N	1	293	I.B.B.M. Angle S & C	Where 2 or more boilers feed one system
P	1	370	Br. Gate	Gas Shutoff
R	1	741-G	Br. Needle	Gas Pilot Shutoff
S	2	741-G	Br. Needle	Pressure Control Line Shutoff
T	2	124	Br. Blowoff	Blowdown assembly
T	2	297	I.B.B.M. Blowoff	Blowdown assembly
U	2	952	Br. Angle	Blowdown assembly
U	2	615	I.B.B.M. Angle	Blowdown assembly
V	1	741-G	Br. Needle	Boiler Vent Valve

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